COAL AGE

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The Two Spirits

By Berton Braley

Written expressly for Coal Age

Two spirits waited at Heaven's gate
And one was confident, smug, sedate,
The other was weary and labor-bowed,
Mighty shouldered and blackly browed,
And the cultured spirit drew away
With a glance at the other's rough array.

"Speak up, you spirits," St. Peter cried,
"And tell me why you would step inside."
"Sire," said the polished one, "Let me in,
A golden crown I am fit to win,
For the world has always known of me
As a splendid giver to charity,
A leader of uplift, near and far,
So let me in where the good souls are."

"I'm wise," said Peter, "You got your rents
From rotten houses and tenements,
Then thought to cheat your God, good lack!
By giving some of the money back.
You gave your gold—on a wholesale plan,
But did you ever, your whole life's span,
Help some poor devil—as man to man?
Did you ever toil, did you ever learn
What a dollar means that you have to *earn*?"

The head of the cultured soul hung low,
And meekly and faintly he answered, "No."

"You're sort of a useless thing, my lad,
But I reckon your bringing up was bad,
So I'll send you back to the earth once more
Don't putter around as you did before,
But get in the rough world's work and strife
And learn the joy and the pain of life,
And play and work with your fellow men
—And after awhile you can call again!"

To the other spirit St. Peter said,
"What did you do in the life you led?"

"Just dug the coal," was the soul's reply,
St. Peter viewed him with kindling eye,
"What else?"—
"Why nothing," returned the soul,
"Nothing important—just digging coal."

"Nothing important, just digging coal!"
St. Peter laughed at the puzzled soul,
"Just digging coal—to make the steam
Which makes a fact of the dreamer's dream,
Just digging coal—whose power has hurled
Man's mightiest engines round the world,
Just digging coal, whose white hot glare
Beats back the winter's bitter air,
Just digging coal!—oh friend of Man,
Come in and join the Heavenly clan,
You did your work nor shirked nor swerved,
And Heaven is made—*for those who served*!

Remodeling an Old Mine

By John E. Ambrose

*SYNOPSIS—**The need of both increased capacity of the ventilator and the ability to reverse the current. Description of method used to replace old timbers with steel I-beams without interruption of the operation of the mine.***

Some time ago, it was my fortune to have charge of the work of remodeling a shaft sunk to the Pittsburgh seam, for the Federal Coal & Coke Co. This shaft is located at Grant Town, on a branch line of the Baltimore & Ohio R.R., about 11 miles from Fairmont, W. Va. Upon a change of management, it was decided to make a number of improvements, both in the equipment of the mine and the arrangement of the underground workings.

The Ventilating System

The ventilation of the mine, up to that time, had been produced by an exhaust fan located at the mouth of the airshaft but set a short distance back from the top of the shaft, with which it was connected by a fan drift constructed of sheet steel. This ventilator produced good results, but the later development of the mine would require a larger quantity of air in circulation, which would be beyond the capacity of the fan to produce. Moreover, since the mine generated gas, it was decided that a reversible fan was needed that would throw a larger quantity of air under a low water gage. The fan chosen for this purpose was a Robinson fan of the reversible type.

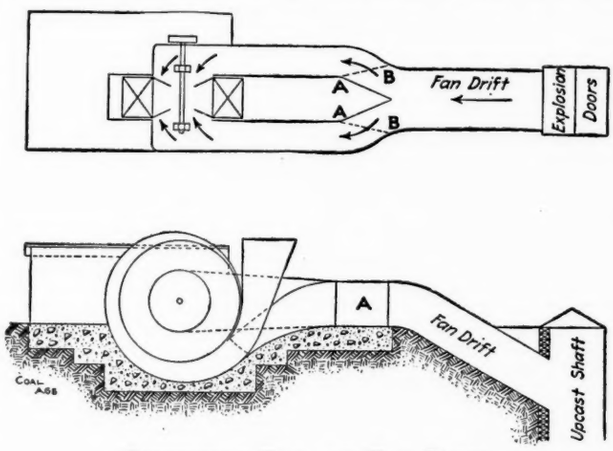
The general arrangement of the fan drift and its connection with the upcast shaft is shown in the accompanying figure. The air current coming up the shaft and entering the fan drift is divided by the doors *A A*, so that half the current enters each side of the fan. These doors can be swung into the position indicated by the dotted lines *B B* when it is desired to operate the fan on the blowing system. It is then also necessary to open other doors in the side of the fan drift, to admit the free outside air to the fan, and to close the door that permits the fan to discharge the air into the chimney, instead of which the air passes from the fan into the fan drift and thence into the mine. By this means, the fan can be converted at once from an exhaust fan into a blower. The last doors mentioned are not shown in the figure.

The walls and floor of the fan drift were constructed of concrete; and, as shown in the figure, this drift was carried down on an angle of about 30 deg. and intersected the shaft 10 ft. below the surface. The foundation of the concrete walls were 18 in. thick, but these were carried up with a thickness of 12 in. above the ground line. The roof was constructed of 30-lb. steel rails laid across the top of the sidewalls and covered with concrete reinforced with ¾-in. round iron and steel wire netting. The fan drift was 10x10 ft., giving a sectional area of 100 sq.ft.

Plan of Conducting the Work

It is not intended, here, to give a full description of the details of this work. Before remodeling, the shaft bottom was timbered with 12x14-in. oak timbers, 25 ft. long, the collars being supported on legs, on each side of the entry, at a height of 5½ to 6 ft. above the rail. The timber sets were generally put in on 3-ft. centers, but close to the shaft the frames were set "skin to skin." It became necessary to remodel the shaft bottom, because many of the timbers contained dry rot that caused them to break in the middle. More room was also required for the handling of the necessary supplies.

It was decided to replace the oak timbers with 12-in. I-beams, having 8-in. flange faces, the thickness of the central web being 0.35 in. These beams were to be set on sidewalls of concrete at such height as to give 7 ft. headroom or clearance above the rail. A short distance from the shaft, the roof slanted upward until it attained a height of 13 ft., at the shaft. The purpose of this was to expedite the handling of the heavy 40-lb. rails used on the haulage roads and to enable these to be loaded on trucks directly from the shaft. The I-beams supporting the roof were to be lagged with 20-lb. steel rails cut to the proper length. This gave an absolute fireproof shaft bottom, which, when painted with a special paint to preserve the steel from corrosion, would last during the life of the mine.



Reversible Fan and Fan Drift

The legs supporting the collars and standing at the sides of the entry were in the way of building the concrete walls. In order to make room for these walls, it was necessary to remove the timber legs. Before this could be done, however, temporary posts had to be set under the collars, as close as possible to the track, allowing only room for clearance of the cars. The legs were then removed and ditches were dug in the bottom slate, varying in depth from 6 to 9 in., according to the nature of the bottom, and 15 in. wide, which was the width of the concrete wall to be built. This work was commenced on the inby end of the shaft bottom and proceeded toward the shaft. As quickly as a few legs were removed, the ditches were dug on both sides, the necessary forms constructed and concreting commenced.

Two gangs of men were kept busy, one standing the temporary posts and removing the old legs from the side of the entry, and the other digging the ditches, building the forms and filling them with concrete. While the work was in progress, about one-third of the length of the shaft

bottom was thus supported on temporary posts and the hoisting of coal was not interrupted. When the timber gang had reached a point close to the shaft, they were brought back and began the work of removing the old collars and replacing them with the steel I-beams. This work was difficult, as anyone experienced in retimbering mine passageways will realize. Great caution was necessary in order to prevent a fall of roof that would block the entries and delay the hoisting of coal.

At a point about halfway from the shaft, it became necessary to saw off the ends of the collars, in order to provide the necessary height of the sidewall to give 7 ft. of headroom above the rails in the completed entry. Again, at a point about 15 ft. from the shaft, the walls had to be run up on an angle of about 28 deg., to make the 13 ft. of headroom at the shaft, as previously mentioned. To do this, it was necessary to take down 6 ft. of toprock, which proved a tedious operation, inasmuch as some of the roof was loose and it was impossible to set posts to secure it properly, as the concrete walls had to be built before the steel I-beams could be put in place. It was also necessary to keep all the tracks clear.

Electricity in Coal Mining

By David R. Shearer*

SYNOPSIS—This is the first article of the series and deals with the calculations employed in direct-current work. The formula used is explained by examples.

It is presumed that the reader is acquainted with the fundamentals of direct or continuous current, but a brief outline of the characteristic features will be here given.

A direct current of electricity may be compared to the steady flow of a stream of water in a pipeline and in the same manner, electrical action may be compared, for clearness of conception, to hydraulic phenomena as follows:

The pressure of the supply of electricity is measured in volts and can be compared to the pressure in pounds per square inch in a water or steam pipe. Thus, we say a generator works at a pressure of 250 volts just as we would speak of a boiler working at 80 lb. As an example, the electrical pressure or voltage of an ordinary dry cell is 1.5 volts, of a storage cell 2 volts, of the standard lighting circuit 110 volts and of the usual mine supply system 250 volts, although in some of the older installations a pressure of 500 volts is still used.

The flow of an electrical current or quantity per unit of time is measured in amperes and may be compared to the flow of a stream of water in gallons per minute.

Resistance is measured in ohms and may be compared to the friction of the waterpipe restricting flow.

Certain dependent relations may also be compared hydraulically, for instance, the higher the voltage, the greater will be the flow of current through a given wire, just as more water will flow through a given pipe, if the pressure is raised; also, just as the friction on a pipe increases in proportion to the length and varies in inverse proportion to the cross section, so the resistance of a wire increases directly with the length and inversely with its cross-sectional area.

The Law of the Electric Circuit

The fundamental law of the electric circuit known as Ohms law is: $I = \frac{E}{R}$. Where I = current in amperes, E = electrical pressure or voltage and R = resistance measured in ohms. This formula or law may be transposed to other forms, viz.: $IR = E$, $R = \frac{E}{I}$.

The power of the circuit is IE in watts and as the watt or $^1/_{746}$ horsepower (hp.) is an extremely small unit, the kilowatt (kw.) or 1000 watts is more generally used in rating power installations. Now, as 746 watts = 1 hp. and 1000 watts = 1 kw., then 1 kw. = 1.34 hp. nearly. As an example, what is the theoretical horsepower of a motor requiring 14 amperes at 110 volts?

Solution: $hp. = \frac{I \times E}{746} = \frac{14 \times 110}{746} = 2.06$

A definite amount of power is always lost in forcing the current through any conductor, this loss, of course, being proportional to the resistance of the circuit. This is usually known as voltage drop or lost volts and the actual power or wattage thus dissipated is easily computed. Example: The resistance of a line of wire is 2 ohms, the voltage at the sending end is 110 and the current forced through the wire is 5 amperes. What is the voltage drop at the receiving end and the power lost in the line?

Solution:

$I = \frac{E}{R}$ or $E = IR$ $\qquad E = 5 \times 2 = 10$ *volts lost*

$110 - 10 = 100 =$ *voltage at receiving end.*

Power lost $= I \times E = 5 \times 10 = 50$ *watts* $= {}^1/_{14}$ *hp.*

By substitution in watts lost

$I \times I \times R =$ *watts lost or* I^2R

In calculating actual mechanical power produced by an electric current of given voltage, we must further consider another factor, the efficiency of the generator or motor. This means that there is some loss in converting mechanical energy into electricity and *vice versa*. The efficiency is usually written as a decimal or in percentage. Example: The efficiency of the generator is 80% or 0.8, how much current will be produced at 110 volts by a 10-hp. engine driving the generator?

Solution:

10 *hp.* = 7460 *watts theoretical hp. produced*

$7460 \times 0.8 =$ *actual electrical hp. produced*

$= 5968$ *watts*

*Knoxville, Tenn.

[Note—Many good engineering handbooks are to be found dealing with the details of electrical construction; however, there is a considerable demand for information concerning the application of electricity to coal-mining work. With the idea of somewhat filling this want, Mr. Shearer has compiled some valuable data on electrical engineering as applied to coal mining, and a large part of this material will be published in succeeding issues of "Coal Age." Later, the complete text of the articles will be issued in book form by the McGraw-Hill Book Co., of New York.—Editor.]

The Friedrich Heinrich Colliery at Lintfort, Germany

By P. Büssing

SYNOPSIS—A recent German development, embodying many features not found in American plants.

The very recent opening of this German mine, 1913, makes the particulars of its development of unusual interest. The property covers about 11,000 acres and is situated in the northern extremity of the Rhine Province, not far from the well known Krupp Works, at Essen. As the mine is unusually wet, the two shafts, 20 ft. in diameter each, were sunk by the freezing process. Operations were begun in July, 1907, and the mine was ready to be worked in February, 1913.

At present, the drainage water is removed by an electrically operated unit, consisting of two centrifugal pumps of five stages each, directly driven by an intermediate motor and designed to handle 1000 gal. per min. over a 1900-ft. lift. The motor develops 900 hp. at 1480 revolutions. The low-pressure pump rings are of cast iron, the high-pressure ones, of steel. Each ring is cast in one piece with inlet and outlet.

Note—Translated and abstracted from series of articles appearing in the Feb. 7, 14 and 21 issues of "Glückauf."

The Surface Plant Is Particularly Interesting

The plant above ground is of especial interest, embodying the latest German engineering practice for the comfort and convenience of the workmen, as well as for the most economical operation, due regard being had for the future and for general appearance as well. Care was taken to design all the buildings in one style, so that each forms a harmonious unit of the whole plan. The Administration Building and the homes of the manager and his staff are on the west side of Friedrich Heinrich Ave. The mining plant and all its buildings are on the opposite eastern side (see Fig. 1).

The offices for the foremen and timekeepers are in the same building as the baths, the former being arranged around three sides of an open light court (see Fig. 2);

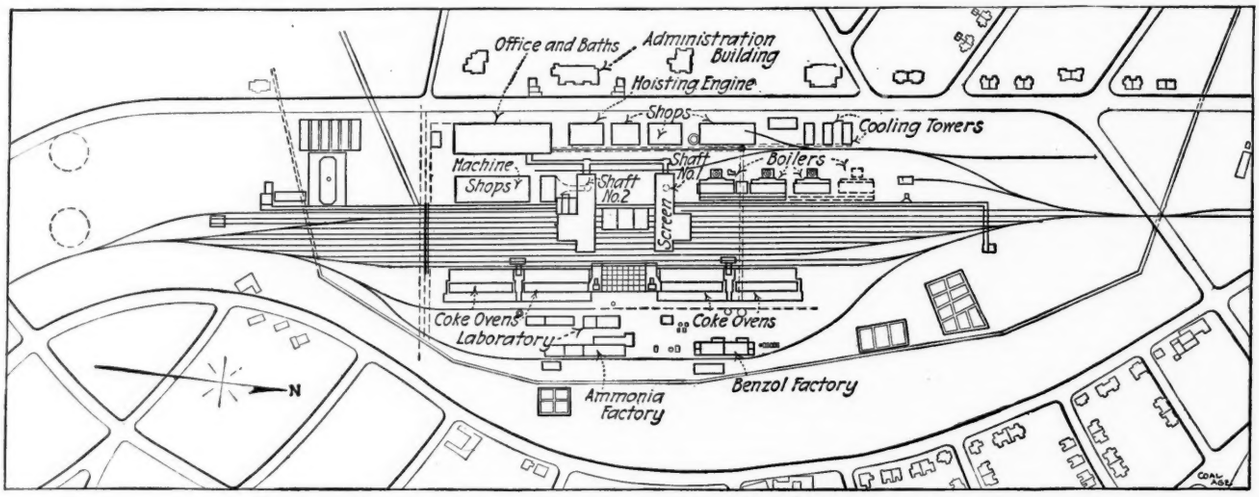


Fig. 1. Surface Arrangement at Friedrich Heinrich Colliery

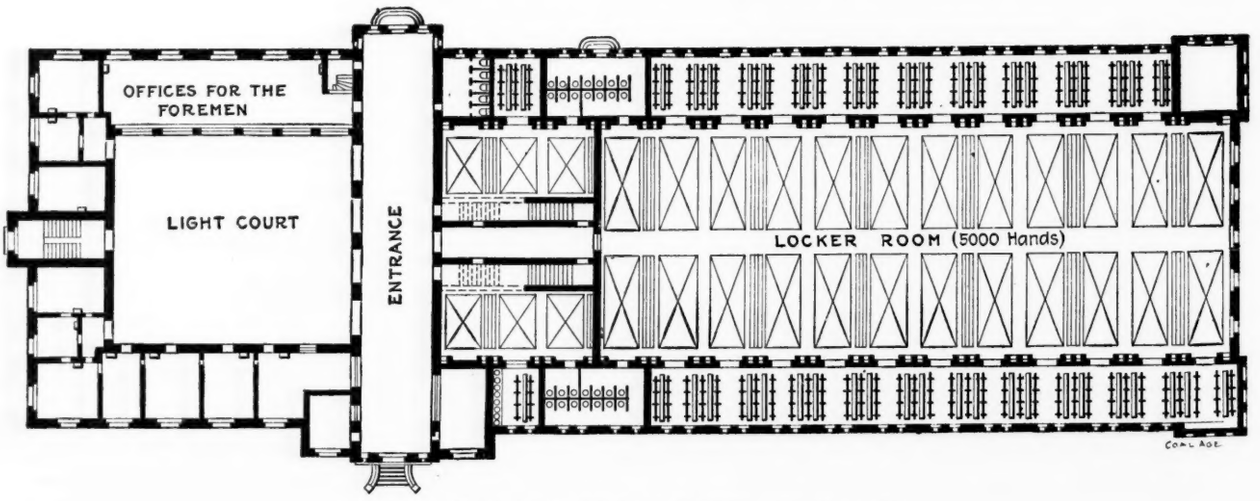


Fig. 2. Ground Plan of Offices and Baths

the bathing arrangements taking the rest of the floor. The baths for the management are on the upper story. The locker room is large enough for a payroll of 5000 men and occupies the center, while the showers and toilet rooms are on both sides. The men in charge of the baths are stationed on a platform, from which all the rooms can be overseen and on which the valves for the heating system, as well as for the hot and cold water, are located. The entire building is heated by a hot-water exhaust-steam system.

In Fig. 3 is shown, on a larger scale, the arrangement of the shafts, hoisting engines, store house, power house, etc. In the store house, in addition to the oils, supplies and machine repair parts, is a garage for an electric ambulance, a doctor's office and an emergency room. The location of the shops is clearly shown in Fig. 1.

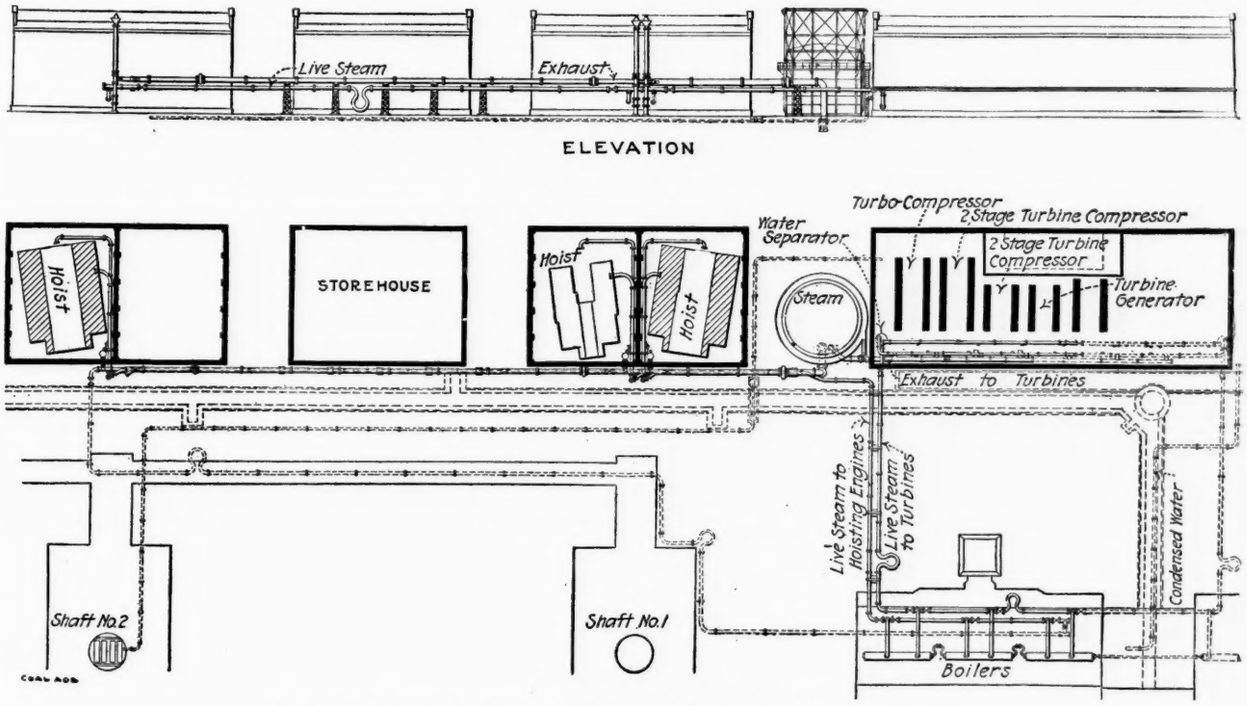


FIG. 3. GENERAL ARRANGEMENT OF PLANT AND STEAM PIPING

Above the baths is the lamp room, from which covered bridgeways lead to the shafts. The entrance to and exit from the shafts are separated completely, so that the workmen never interfere with each other on going to and from the mine.

Under the offices, in the basement, is a steam laundry, an eating room for the miners and day laborers, a bar for the sale of milk and nonalcoholic drinks, a bicycle room and a room for instruction in life-saving work.

THE POWER SYSTEM IS INTERESTING

The power system is as follows: There are three hoisting engines, two for shaft I and one for shaft II, all alike in design (see Fig. 4), using superheated steam at 572 deg. to 662 deg. F. and 190 to 200 lb. pressure. They have a capacity for handling 11,000 lb. at a depth of 1500 to 2400 ft., at the rate of 65 ft. per second. The steam from the hoisting engines exhausts into a receiver

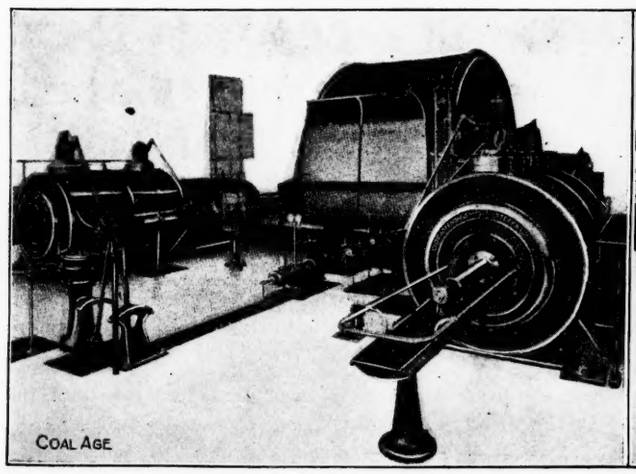


FIG. 4. HOISTING ENGINE FOR SHAFTS

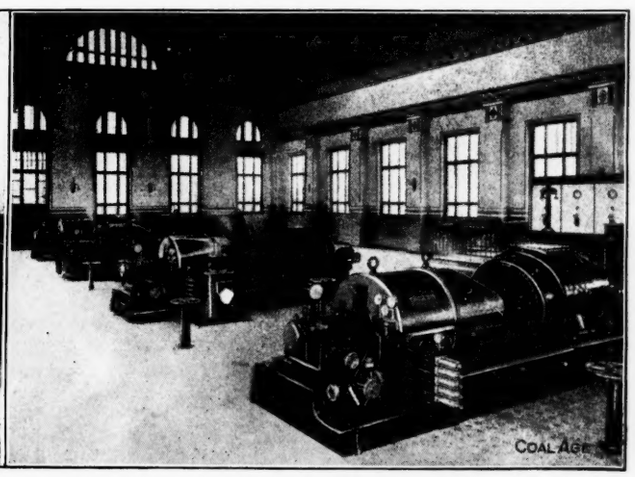


FIG. 5. INTERIOR OF CENTRAL POWER HOUSE

(see plan and elevation, Fig. 3), which resembles and operates like a gas holder.

In the central power house (see Fig. 5), direct-drive turbines are used exclusively, for both the electrical and the compressed-air systems. The cut shows two turbine compressors and two turbine generators. Each machine has a surface condenser directly under it, in the basement, and each condenser has its own pumping system. The two units in the foreground of Fig. 5 are turbine generators, the other pair are the air compressors.

The turbine for the two-stage centrifugal compressor, under normal conditions, takes steam from the receiver at a pressure of about 15 lb., absolute. The generator turbine is of the same general design. Each turbine consists of a high-pressure part, which acts as a velocity wheel, and a low-pressure end operating by reaction, the thrust being equalized by a piston.

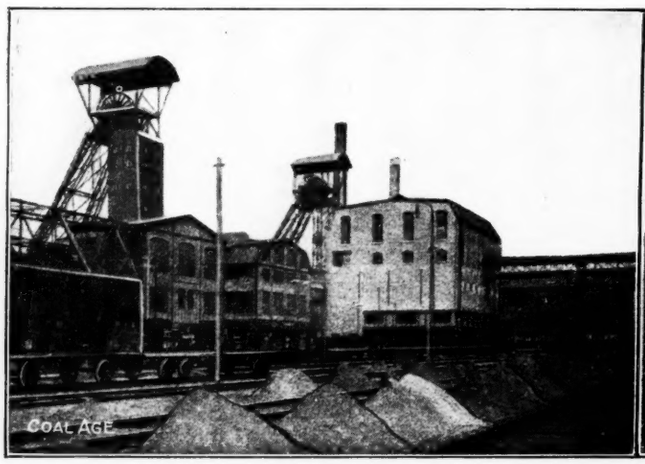


FIG. 6. SHAFT TRESTLES, WASHING AND SCREEN PLANTS

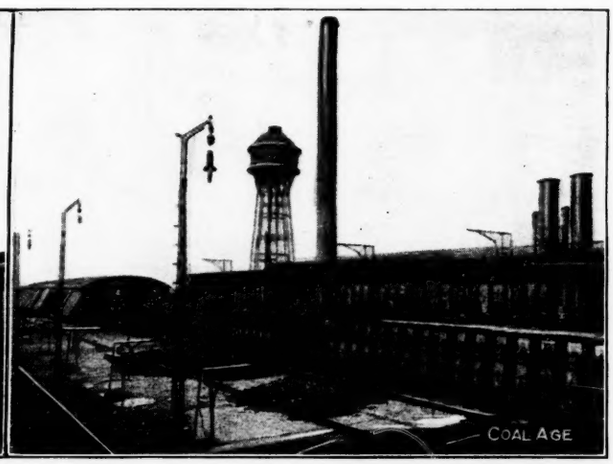


FIG. 7. VIEW OF COKING PLANT, SHOWING OVENS AND COKE YARD

The other two turbines are for reserve and are designed for superheated steam at 140 lb. pressure and 572 deg. F. Should the steam supply in the low-pressure holder run short, so that there is danger of the receiver being connected with the condensing apparatus and collapsing, live steam is admitted automatically. Moreover, the turbines can be driven by a mixture of live and exhaust steam. The rating of the turbo-generators is 1000 kw. each, and they operate at 3000 r.p.m. The duty of the turbine air compressor is 675 cu.ft. per min. to 90 lb. pressure.

In Fig. 6 we have a view of the trestle work of the two shafts, washery and screen. The daily output is 5000 tons, of which 4000 tons pass through a 3-in. mesh and are sent to the washery.

There are in operation 180 coke ovens with 60 more under construction (see Fig. 7). The chief byproducts are tar, ammonia and benzol. The total outlay of the company to date has been about $9,000,000.

Portable Electric Lamps

The Bureau of Mines has just issued Schedule 6, "Procedure for Establishing a List of Permissible Portable Electric Mine Lamps." This schedule sets forth the character of the tests and the conditions under which they will be made, together with the fees that will be charged for testing the lamps. It is the purpose of these tests to establish a list of portable electric lamps that are suitable in all respects for the unusual requirements of mine service. All lamps that pass these tests will be specificially approved by the bureau, and all the mine inspectors will be notified of the bureau's action.

Accidents in Anthracite Mines

A statement issued by the State Department of Mines shows that the fatal accidents in and about the anthracite coal mines for the three months ended Mar. 31, 1914, numbered 123, as against 146 for the same period in 1913. The inside accidents numbered 100, as against 128, and the accidents on the surface 23 as against 18.

Of the 100 killed inside during 1914, 41 were killed by falls, 16 by mine cars, 9 by explosions of gas, 5 by suffocation from gas, 4 by explosives, 12 by premature blasts, 6 by falling into shafts and slopes and 7 by miscellaneous causes.

In 1913, 68 were killed by falls, 27 by cars, 7 by explosions of gas, 1 by suffocation by gas, 5 by explosives, 14 by blasts, 7 by falling into shafts and slopes and 17 by miscellaneous causes.

During 1914 the inside fatal accidents were 28 less than in 1913. The accidents on the surface were 5 more in number.

By the Way

No man's religion ever survived his morals.

He who is not ready today will be less so tomorrow.

A man's character reaches town before his person.

The remedy of tomorrow is too late for the evil of today.

A prompt refusal has in part the grace of a favor granted.

It generally costs more to revenge injuries than to bear them.

Most men reason from their heads but act from their hearts.

The worst punishment of all is that in the court of his own conscience, no guilty man is acquitted.

Lessons of the Vancouver Strike

By Special Correspondence

SYNOPSIS—A brief review of the strike in Vancouver Island. A strange condition presented by the mines of Vancouver, which are working regularly and producing all the coal the market demands, while a waiting list of 100 names of miners for whom no places can be found, shows plainly that there is, in fact, no strike. A comparison of conditions and wages in Vancouver with those of miners in the States is invited. The lesson of the strike.

The mining situation on Vancouver Island has now reached a most curious stage. In a previous article, I dealt with the origin, causes and history of the Vancouver strike, which was engineered by paid officers of the United Mine Workers of America. The strike began in September, 1912, at the Cumberland and Ladysmith mines of the Canadian Collieries Co. For a couple of months, the production of these mines was badly crippled. The company, however, began to get command of the situation again, in May, 1913, whereupon, the U. M. W. of A. officers called out the men of Nanaimo and South Wellington. Again, the Island output of coal was seriously curtailed, until September of the same year, when the companies resumed mining operations. Progress at first was slow, but gradually quickened until today it can be said that, while the trouble on the Island still continues, the strike is over.

A Strange Spectacle Presented

This is the curious feature of the present situation. If by a strike is meant the stopping of any industry, then most emphatically there is no strike at the coal mines of Vancouver Island. It is an easy matter to establish this assertion, as the following facts will prove. In the first place, the operators are unable to give employment to all the men seeking work. In Nanaimo, for example, there are 100 names on the waiting list at the mines—100 men waiting their turn for work, as places are found for them. In the second place, in addition to this surplus of labor, more coal is being produced than can be marketed. The Jingle Pot mine is working little better than half time, while the Cumberland mines are working less than full time. The Nanaimo mine, alone, is working every day. At this time, the mines on the island are producing more coal than can be sold. In the third place, there are the figures for the total output of coal that demonstrate the same truth. In the boom year of 1911, the aggregate daily output of all the Island mines was about 5250 tons. Today, the total daily output of all the mines in operation is 4800 tons, which shows a difference between the production in the record year 1911 and the present of only 450 tons.

No further evidence is necessary to prove conclusively that there is no longer a strike on the Island. It is true that the U. M. W. of A. trouble still continues, inasmuch as a large number of its members are yet idle. The officers of this organization, the leaders and makers of all the trouble, still tell their followers that they will win the strike, notwithstanding the real facts of the situation which have just been related. The U. M. W. of A. may continue the trouble as long as it chooses; but the strike itself is absolutely all over as far as the mines are concerned. The U. M. W. of A. as an organization does not in any way affect the operations of the mines; and the situation on the Island, which the miners in the United States are blindly contributing to maintain, is an anomaly.

Comparison of Working Conditions in Vancouver Island

Compare, for a moment, the working conditions and wages of the miners on Vancouver Island with those of the American miners, who are financing this strike and who have been given to understand that its object is to secure better conditions and higher wages for the men here. As a matter of fact, it is extremely doubtful if the miners in the United States are as well off in this respect as the men on Vancouver Island. In the first place, the miners here have an 8-hr. day, from bank to bank. In Nanaimo, this means that the men, on an average, work less than 6½ hr. a day, at the face. For this working day, the datal wage is $3.46; firebosses, $4.01; shotlighters, $3.78; face men, $3.56; drivers (single) $3.15½, (double) $3.30; pushers, $3.02 and brattice-men, $3.46.

The above are all scale wages and it is unnecessary to quote the list further. Diggers and loaders (the latter following machines) are employed by contract. For the higher seam, the price is 74.8c. a ton; and, for the lower seam, 80c. a ton, with scale allowances for rock. The average daily earnings of diggers, for months past, as before the strike began, have been over $5; while loaders, during the same period, averaged $4.35 a day. These are the wages made by the miners of Nanaimo, and the mines are operated with every care for safety. The Western Fuel Co. was the first, in the province, to install a Draeger rescue station; and is admitted to have lived up to its avowed policy of "Safety First" at any cost. With these facts before them, American miners can make the comparison for themselves, and then ask why they should be taxed to support a strike that, as a fact, no longer exists.

The Lessons Taught by the Strike

The lesson taught by the whole trouble is that no industry is secure against the machinations of the paid agitator. The miners on the Island did not want a strike. Had they been left to themselves, there never would have been a strike. In the case of Nanaimo, the miners were never even consulted. They were called out and were refused the ballot that they demanded. At Cumberland, the strike was begun under false pretenses. There were no grievances that could not have been adjusted in half an hour's conference. In Nanaimo, there were no complaints at all and, moreover, the men were working under a regular agreement with the operators. Yet with no grievances at hand and with the mining industry itself more prosperous than ever before in its history, a couple of paid agitators were able to stop the whole machine of production. They cajoled or forced the miners into a strike, for no reason that the men themselves knew, and imposed the burden of supporting it upon the miners of the United States, who knew nothing about the true situation. It was as unfair to the miners here as it was unjust to the miners in the States.

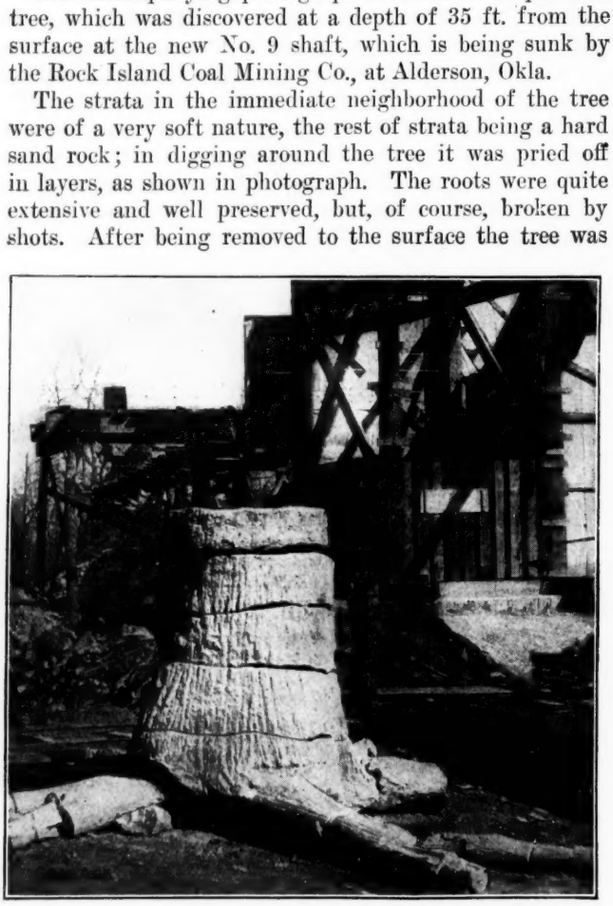
Viewed from any angle, the attempt to force this strike

upon contented miners must stand as a severe blow to organized labor and a disgrace to trade unionism. It cannot be freed from the suspicion of ulterior motives. The only persons who have benefited from it are the two or three men who engineered it and who fell into well paid billets as a reward for their work. They have drawn their salaries all through the strike; and it is even charged that some of these men have drawn strike pay as well. These charges are being investigated in the local union now. They are the men who tried to tie up the mines on the Island and who have kept hundreds of men from their work, for over a year, and imposed a heavy burden upon the miners of the United States. In the last analysis, with the laws of the country as they are, no industry is secure against the schemes and plots of one or two professional agitators. This is the great lesson of the strike on Vancouver Island.

An Interesting Fossil

The accompanying photograph shows a fossil petrified tree, which was discovered at a depth of 35 ft. from the surface at the new No. 9 shaft, which is being sunk by the Rock Island Coal Mining Co., at Alderson, Okla.

The strata in the immediate neighborhood of the tree were of a very soft nature, the rest of strata being a hard sand rock; in digging around the tree it was pried off in layers, as shown in photograph. The roots were quite extensive and well preserved, but, of course, broken by shots. After being removed to the surface the tree was



PETRIFIED TREE DISCOVERED IN SINKING SHAFT

set up as shown in photograph; however, a great many parts of the roots were carried off by curio hunters.

The trunk of the tree, which was removed without breaking, is about 7 ft. in height, 3 ft. in diameter at the top and 5 ft. in diameter at the bottom. This shaft was started on Mar. 9, and is now at a depth of 145 ft., 115 ft. of which has been in solid sand rock. At a depth of about 118 ft. the shaft went through what looked to be a creek bed, which was full of fossil shells, and stems of different descriptions; this character of strata continued for a depth of about 18 ft. After going through this soft strata, the shaft again struck sand rock and is still in same.

This shaft will be in the neighborhood of 804 ft. in depth, and will be the deepest pit in the southwest. It will be equipped with the latest improved machinery.

The Consumer and Higher Anthracite

An official of one of the railroad anthracite companies says: "Apparently the last thing a public service commissioner, or interstate commerce commission, or department of justice representative thinks about, if he considers it at all, is public service or cost to the public. Increase railroad costs and reduce efficiency seem to be the watchwords.

"Look, for instance, at the suits to separate the railroads from their anthracite holdings. Suppose the Government wins! In that event there will be more independents in the field, and there will be absolutely no bar to higher prices for anthracite. It is well known that the anthracite railroad companies keep the price of anthracite within moderate levels. Whenever severe weather brings about a squeeze, the independent demands a premium of $1 or $1.50 a ton, and gets the largest premium possible.

"In the case of any commodity, where the demand at times far exceeds the supply, a high price is bound to come in an unrestrained market. It needs no deep study of statistics to show that the demand for anthracite is increasing with the growth of population, and, with the greater use of this coal in the West, to a larger extent than the supply. If unrestrained competition is permitted to rule, a higher cost to the anthracite consumer is inevitable.

"To mine anthracite, companies of the largest financial strength are necessary. Look at Reading's experience back in the late 90's. With all its wealth of unmined coal the road became bankrupt. Look at the Philadelphia Coal & Iron Co.'s income account, and see how small the margin of profit, and at times the losses from mining coal. The withdrawal of the railroad companies from extending their financial support to the mining of anthracite which will be a result if the Government wins, will increase the cost of anthracite to the consumer.

"The Interstate Commerce Commission has increased our switching expenses and delayed our service to the consumer, and has really benefited no one by breaking up this practice. Formerly, all our coal gathered at New York tidewater was considered as merely so much coal. From the general supply orders were filled or the company got its fuel as needed. Now no car is loaded at the mines without a definite consignment, and when the cars reach tidewater an infinite amount of switching has to be done."

"The sacrifice of efficiency and the increase of cost to the consumer, of course, are minor matters when theories make principles for the operation of railroads and the course of prices. The Standard Oil trust was dissolved, and everyone agreed that unrestrained competition came to prevail, but the increased cost to the consumer of gasoline and oil was noteworthy. Eventual higher cost to the consumer of anthracite is no rash prediction."—*Wall Street Journal.*

Self-Contained Portable Electric Mine Lamps

By H. O. Swoboda*

SYNOPSIS—The frequent occurrence of mine explosions caused by defects of oil safety lamps has encouraged the development of electric lamps. Satisfactory results, however, have been obtained only since the invention of the tungsten filament, permitting the use of smaller storage batteries. The general requirements for electric lamps are: Absolute safety, uninterrupted production of light for at least one shift, and a foolproof design.

It is a well known fact that many mine explosions with enormous losses of life and property, have been caused by defects and improper handling of the so called miners' safety lamps, built on the Davy principle. The Bureau of Mines, for instance, mentions in one of its reports that at least two disasters in this country in 1912 were caused in this manner, killing more than a dozen men, and the Prussian Government states that during the decade from 1902 to 1911 at least 27 per cent. of all explosions in the coal mines of that country were to be blamed on these lamps. Therefore, it is only natural that attempts to develop a portable *electric* safety lamp were made many years ago. Satisfactory results, however, have only been obtained since the carbon filaments were superseded by tungsten. Due to their high economy in current consumption they permit the reduction of the battery to such an extent that the weight and size of the portable lamps no longer prevent the miner from moving around freely in performing his duties.

General Requirements

Electric safety lamps must fill the following requirements: Absolute safety against ignition of mine gases, uninterrupted production of a steady and sufficient amount of light for at least one shift, and absolutely foolproof design.

Besides this, it is essential: That they have a simple and durable construction, that their weight is kept at a minimum, and that the charging and inspecting of the batteries is made easy.

Careful experiments, conducted by the Bureau of Mines in Pittsburgh, and also at Gelsenkirchen, Germany, have shown that the only source of danger in a portable electric lamp is the glowing filament of the bulb.

As long as the maximum short-circuiting current of these batteries does not exceed

100 amperes for batteries with not more than 2.5 volts
85 amperes for batteries with not more than 4.0 volts
65 amperes for batteries with not more than 5.0 volts
45 amperes for batteries with not more than 6.0 volts

sparks obtained by the breaking and establishing of the electric circuit are not of sufficient strength to ignite mine gases, due to the low voltage and amperage of the batteries used. Therefore, it is not necessary to provide special protection against sparking on the switch and on the connections between battery and lamp.

As the filament under normal conditions is operated in a vacuum and enclosed in a glass bulb, the danger of igniting mine gases exists only in case this bulb is smashed without the filament being broken at the same time, so that the latter continues to glow until it burns out. Several absolutely safe methods can be employed to prevent the filament from glowing after the bulb has been broken, and one method which has been in actual use for a number of years will be described in the course of the paper.

Steady and Sufficient Light

The miners' *old* safety lamps furnish a flickering light of about 0.8-c.p. capacity, which rapidly decreases during the shift to about one-half. This is not sufficient light for the miner to perform his work satisfactorily, and, according to the investigations made by Dr. T. Lister Llewellyn, England, is the principal cause of the special eyesickness (miner's nystagmus) with which miners become affected. For this reason it was considered advisable to equip the *electric* mine lamps with incandescent lamps of at least 1.5 c.p.

The only source of electrical energy which will produce this amount of light satisfactorily for at least one shift or approximately ten to twelve hours is the storage battery, primary batteries for such an output being entirely too large for use in portable equipments. Years of development have resulted in fairly satisfactory batteries and it seems, in the present state of the art, that the lead cell, regardless of its weight, on account of its comparatively high voltage and the steadiness with which that voltage is maintained, while discharging, is the most suitable type.

Foolproof Design

Miners' lamps are exposed to extremely rough handling by inexperienced hands and the least mechanical or electrical weaknesses are liable to result in a failure to supply light. The following are about the most important points which must be observed in a successful lamp: The lamp must be locked so that the miner absolutely cannot get at any part of the mechanism. It must burn in any position, even under water, and if dropped on solid material, such as rock, iron or cement from a height of several feet must continue to burn. The incandescent lamp bulb must be thoroughly protected so that it is almost imposible to break it. The electrolyte of the battery must not leak out. Construction of this character is possible, and that lamps satisfying such conditions are in actual use, will be shown later on.

Lamp Designs

During the year 1912 prizes were offered by the British Government for the best portable electric mine lamp and 197 applicants entered into competition and submitted samples. After careful tests extending over several months, the first prize of $3000 was awarded to the makers of the "Ceag" lamp, described in this paper. Since this lamp has also been accepted by practically all other

*Consulting electrical and mechanical engineer, Pittsburgh, Penn.

Note—Article read Apr. 9 at the 293d meeting of the American Institute of Electrical Engineers, Pittsburgh, Penn. This meeting was held under the auspices of the committee on the use of electricity in mines.

European governments and was the first lamp approved by the Bureau of Mines as answering all safety requirements, and still remains today the only approved *hand* lamp, it might be well to study its construction carefully.

The bulb is covered by a heavy glass dome *D*, which is protected by four heavy steel rods *H* held together by a sheet-steel roof *I*. A substantial hook is attached to this roof; thus, the miner can either stand the lamp on the ground or hang it to a post in the immediate neighborhood of his working place. The bottom part, made of heavy corrugated galvanized sheet steel, contains the storage battery. By turning the upper part on the lower, the miner can turn the light on and off.

The construction of the lamp is easily understood from a section shown in Fig. 1.

The Lighting Mechanism

The incandescent lamp rests in a socket, which is pressed upward by a spiral spring *O* against another spring *P* between the bulb and glass dome *D*, providing a complete spring support and preventing breakage even with the most severe shocks. Electric connection is established for one pole through the socket spring *O*, and for the other pole by another smaller spring *E* inside the socket spring, and insulated from it. In case the bulb breaks, the socket spring pushes the socket upwards, and as the inner spring does not expand as much as the socket spring, the circuit is interrupted.

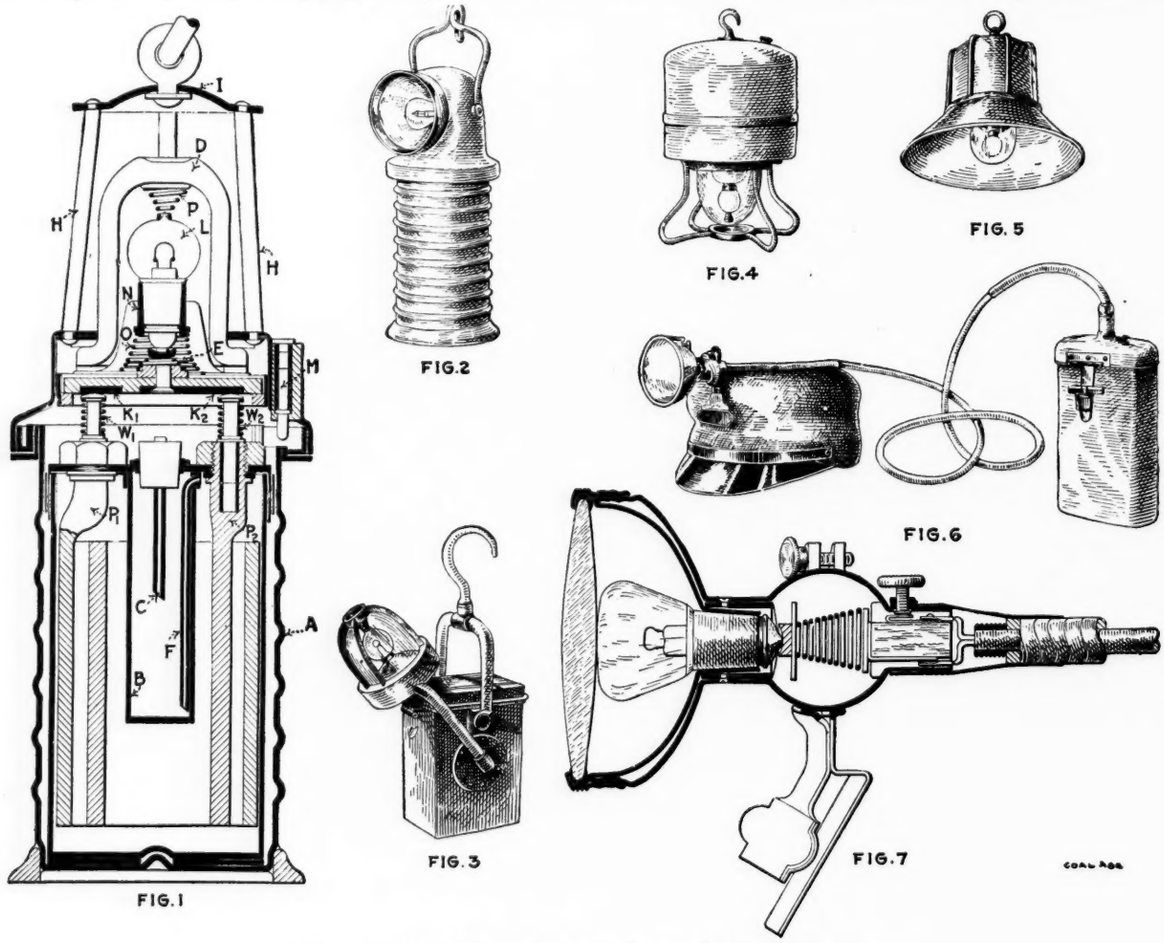
Lately, another safety device has been added, but it is not shown in this illustration. It consists of a fuse, which blows the moment the bulb of the incandescent lamp is broken. This eliminates the possibility of obtaining sparks or getting the filament to glow in case the miner should attempt to push the bulb back into its normal position; it also protects the battery from being short-circuited for any length of time, in case the leads to the bulb have become short-circuited during the accident.

As stated before, the upper part of the lamp turns on the lower part, opening and closing the switch. This rotating movement is limited by a soft iron pin *M*, which acts as a magnetic lock. This pin can be withdrawn in the charging room by a strong electromagnet, and when this is done, the upper and lower parts of the housing separate, and the battery can be removed for charging.

The Storage Battery

The storage battery consists of a single *round* lead cell with concentric electrodes inside of a cylindrical vessel *A* covered with a waterproof lid of the same material. Cylindrical electrodes are preferable to flat ones, as they are stronger and therefore stand rougher handling. They also warp less, so that in charging, the current density can be increased and the length of time correspondingly decreased.

The holes in the terminal sockets contain bushings made of acid-proof metal, into which removable terminals P_1 and P_2 are fitted. These terminals are pressed upward by the terminal springs W_1 and W_2 against the



Various Forms of Electric Mine Safety Lamps

contact segments K_1 and K_2 of the switch, carrying in this manner the current to the incandescent lamp. Terminals and springs can easily be taken out and cleaned by washing in warm water, an important point. The use of nonremovable springs has been found impractical, as they are difficult to clean and consequently are liable to corrode and break easily. First-class contact springs, however, are imperative for an uninterrupted light service.

In charging storage batteries, gases develop, which must have an opportunity to escape. It is, therefore, impossible to make the cells airtight. An ordinary opening, on the other hand, would have the disadvantage that the acid would run out, in case a cell were upset, and this would destroy the housing of the lamp. In order to overcome this difficulty, the center of the cell is equipped with a celluloid tubing *B*, which communicates by means of a small side tubing *F*, with the upper part of the cell, where all gases collect. The gases therefore can pass from the cell through the side tubing *F* and finally through center tubing *C* into the open, whereas any particles of acid carried along by the gases, will be deposited in cylinder *B*. Even if the cell is turned upside down, no acid which may be in the cylinder or any other acid, can escape. In other words, the lamps will burn in any position, without the acid being able to leak out.

The principal dimensions of this lamp are as follows: The weight of the lamp complete is about 5 lb. (2¼ kg.); its height, not including hanger, is 10¼ in. (26 cm.); its largest diameter is 3¾ in. (9.5 cm.) The incandescent lamp consumes 0.85 amp. at 2 volts. The battery has a capacity of 16 amp.-hr., and the maximum charging current should not exceed 2 amperes.

To meet various requirements this standard design is not only made in four different sizes, ranging in weight from 1½ to 5 lb. (⅝ to 2¼ kg.), but it is also made with two storage-battery cells connected in series, resulting for the entire line in capacities ranging from four to sixteen hours of life for one discharge and producing light from 0.75 to 3 c.p.

Lamps for Special Purposes

Beside this, a number of other modifications have been developed, so that mines can be completely equipped today with electric safety lamps, wherever a permanent wiring in connection with the lighting plant is impossible. Lamps are made for rescue parties, cages, powder magazines, shaft lighting, shaft inspection, loading places, blasting, cars and locomotives (head and tail lamps), etc. A few of these modifications are shown in the illustrations.

The standard lamp, being of the "lighthouse" type, distributes its light uniformly over the entire surroundings. The modification shown in Fig. 2, known as the "trip" lamp, has the incandescent lamp mounted on one side combined with a deflector concentrating the light rays in one direction. This design is mostly used for inspection trips and head and tail lamps for cars and locomotives. It is made in the same capacities as the standard lamp.

The "shaft" lamp, illustrated in Fig. 3, is arranged with an adjustable arm, on which the incandescent lamp is mounted, so that the light can be sent in any desired direction. It is made to furnish from 8 to 24 c.p. and to burn from 7 to 12 hours with one charge.

Fig. 4 represents another type of "shaft" lamp, without an adjustable arm. It is made for 8 and 12 c.p. and for 15 and 10 hours of life for one charge.

The lamp illustrated in Fig. 5 is especially suitable for places in which ordinary illumination is not sufficient. It is made for 8 to 32 c.p. and for a life of 7 to 15 hours for one charge.

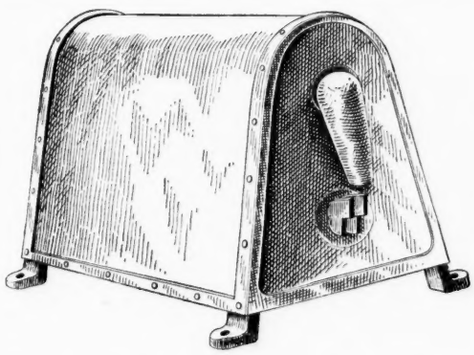


Fig. 8. Magnet for Opening Lamps

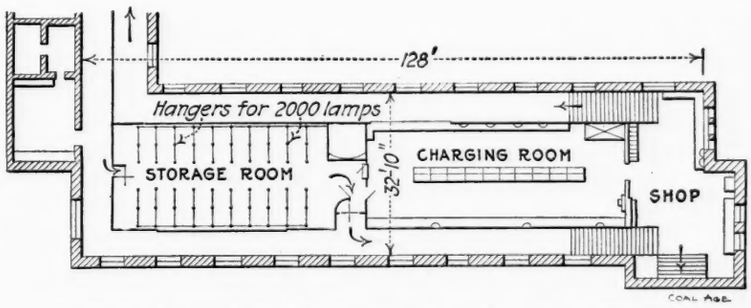


Fig. 9. A Large Electric-Lamp Charging Station

Cap Lamps

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It is only logical that the men in these mines clamor for a type of electric lamp which is as nearly identical as possible with the present form of naked lamp. To meet this demand, electric cap lamps have been developed, the batteries of which are carried by the miner on his belt and are connected to the lamp by a well protected special flexible cord. This lamp is shown in Fig. 6.

The principles of construction of the cap lamp (see Fig. 7) are identical with those of the hand lamp. But several new features have been added. One is the mounting of the incandescent lamp inside a parabolic reflector, the opening of which is closed by a lens, instead of being covered with a glass dome; another is a ball joint, permitting the miner to direct the light rays wherever they are needed.

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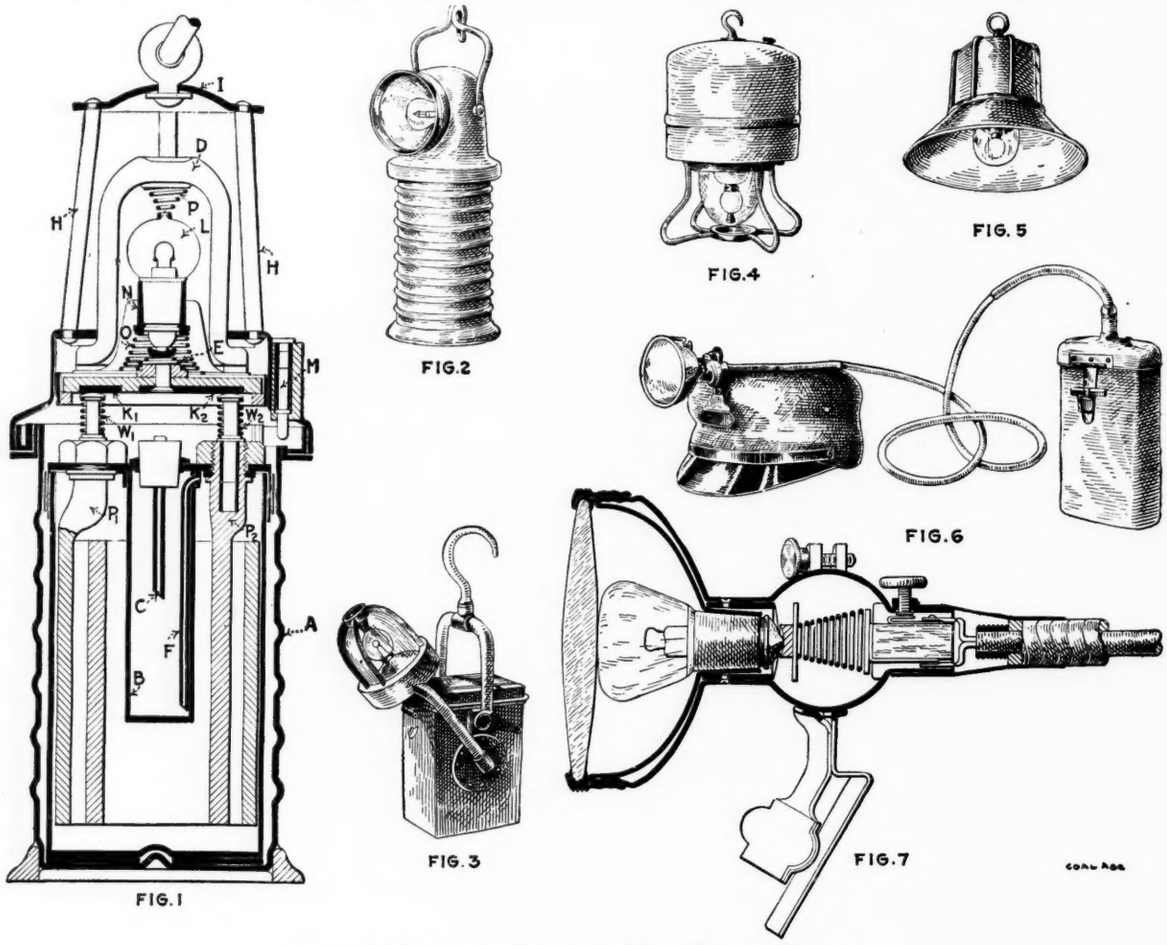

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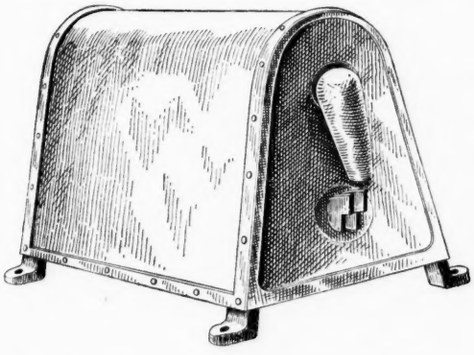

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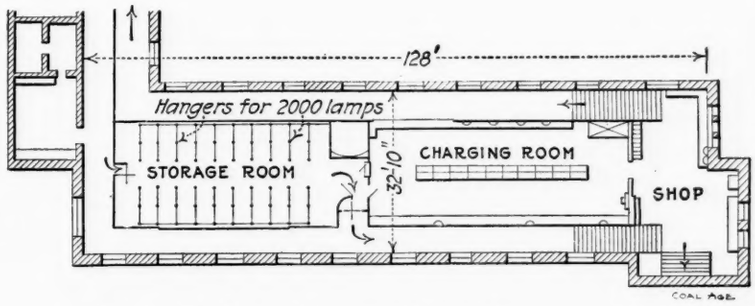

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It is only logical that the men in these mines clamor for a type of electric lamp which is as nearly identical as possible with the present form of naked lamp. To meet this demand, electric cap lamps have been developed, the batteries of which are carried by the miner on his belt and are connected to the lamp by a well protected special flexible cord. This lamp is shown in Fig. 6.

The principles of construction of the cap lamp (see Fig. 7) are identical with those of the hand lamp. But several new features have been added. One is the mounting of the incandescent lamp inside a parabolic reflector, the opening of which is closed by a lens, instead of being covered with a glass dome; another is a ball joint, permitting the miner to direct the light rays wherever they are needed.

A third feature is embodied in the flexible conductors connecting battery and lamp. In case of an accident, there is a possibility that the two conductors may become short-circuited and therefore red hot, eventually setting the insulation afire, if they are made of copper or similar material. To prevent this a special alloy has been prepared, the melting point of which is considerably below the temperature which is required to ignite insulation or mine gas. Consequently, if a short-circuit should take place, the conductors would melt and interrupt the circuit, before there could be a possibility of danger.

From the foregoing description, it can be seen that portable self-contained electric mine lamps of this type have passed the first stage of development, and if one considers that more than one hundred thousand are in daily use in Europe, apparently producing excellent results, there is no reason why the adoption of electric mine lamps in this country should not make rapid progress in the immediate future. The question whether hand lamps or cap lamps, or both, should be used, is a mere matter of detail, which will adjust itself. European practice has adopted the hand lamp exclusively; the sentiment in this country, however, seems to be in favor of the cap lamp. Men who continually change their location in performing their duties will prefer such a lamp, which leaves both hands free for action; men who stay at work in the same place most of the time will favor the hand lamp, which can be set aside or hung up in the neighborhood, relieving them from carrying unecessary weight.

Lamp Service

When the shift leaves the mine, the lamps have to be delivered to the lamp room for recharging and cleaning. For this purpose the magnetic lock has to be opened, so that the battery can be removed from the housing and placed on the charging rack. The unlocking is accomplished by pushing the lamp lock against the pole pieces of an electromagnet (shown in Fig. 8), which lifts the soft iron pin holding the upper and lower parts of the housing together.

Special charging racks have been designed to receive the batteries. Racks are used holding 80 cells connected in two series of 40 each. Each circuit is equipped with a switch, ammeter and rheostat, so that the operator can determine the status of the charge at any time. The rheostats are provided with a surplus of resistance, so that less than 40 cells in a series can be charged, if necessary. A portable voltmeter with a capacity of about three volts is provided to take the voltage readings on the individual cells. Cells are charged, ready for service, when their voltage reaches a value of 2.6. When more than 80 cells are to be charged, two, three or more racks can be combined, and all the cells can be charged at one time.

After the batteries are charged and the contacts and housings have been carefully cleaned, the lamps are reassembled and hung up on special racks, from which the miners remove the lamps, when they begin a new shift.

Lamp Houses

For mines using a large number of lamps, it is essential that charging, cleaning and repairing be handled systematically. For this reason special lamp houses are being erected on the same general principles as those for the Davy safety lamps, but simpler and cheaper, because the lamps need no benzine or oil for the safe storage of which special provision must be made. The ground plan shown in Fig. 9 represents a lamp house erected for 4000 lamps. It consists of a building about 128x33 ft. (39x10 m.), containing a charging room with 20 racks, six opening magnets, three small motors for buffing and cleaning and a small distribution board with a watt-hour meter. To the left of the charging room is the storeroom for receiving the lamps when they are ready for service, and to the right is a small shop for making repairs. Besides this a small room has been provided for a number of benzine lamps, which are used by the firebosses, and on another floor a washroom for the shift.

Importance of Care in Maintenance

Proper care of the lamps has considerable effect on the reliability of the service. One of the large German mines, having several thousand electric lamps in daily use, reports that at first about 5 per cent. of all lamps taken into the mine at the beginning of the shift were returned at the end of the same shift, either burning poorly or not at all. By a careful study of all details in the lamp house and by putting a skilled man in charge of the lamp-house work, this percentage has been reduced to less than 1.5, with the expectation that it will soon drop below 1 per cent.

That this last named figure is not an exception, is verified by the Bullcroft Main Colliery Co., Ltd., Doncaster, England. This company has more than 10,000 lamps in daily use and reports the number of defective lamps per shift to be less than 1 per cent.

The investigation of these defects, when they amounted to 1.5 per cent., showed the following causes:

CAUSES OF FAILURE

	Per Cent.	Per Cent.
Defects due to other causes		0.1
Defects caused by the incandescent lamps:		
Lamps, burning dark	0.6	
Lamps, with broken filaments	0.2	
Lamps, with broken bulbs	0.2	
Total incandescent lamp defects		1.0
Defects caused by the batteries:		
Batteries, leaking	0.1	
Batteries discharged ahead of time	0.3	
Total battery defects		0.4
Total number of defective lamps		1.5

Records covering cost of installing and operating electric mine lamps in this country are not available to any extent, because the number of lamps installed is so far not large and the time during which they have been in operation is comparatively short. However, it should be possible to form some idea of what can be expected, from the experience in Europe.

Cost of Operation 10 to 15 per Cent. Lower Than with Benzine Lamps

While the first cost of electric lamps is undoubtedly higher than that of those burning benzine, the cost of operation, including maintenance, is claimed to average from 10 to 15 per cent. less. Whether the same results can be obtained in this country, the future will have to decide. It may be added that the cost of the electrical energy is small and that the cost of maintenance consists about one-third of labor and two-thirds of renewal of parts, and depreciation.

Of especial importance is the cost of renewing the electrodes of the storage batteries, replacement of complete lamps, which are broken on account of rough hand-

ling and accidents, and renewing the incandescent bulbs.

The life of the electrodes for lead cells ranges from about 100 to 400 shifts, depending entirely upon the treatment which they receive. At the present time large claims are being made for the alkaline cell, which is supposed to last as long as 2000 shifts. This, however, requires verification by actual tests.

Besides this, it must be borne in mind that the higher cost of the alkaline cell, the necessity of using two cells, in series, instead of only one as in the lead battery, and the increase in the renewal of the incandescent lamps, due to the large variation in the voltage, will fully wipe out this apparent advantage. However, the weightiest argument against this claim is the fact that the physical life of mining lamps cannot reach 2000 shifts, as shown below, and that the natural deterioration of all parts is considerably below this limit.

The replacement of complete lamps which are broken on account of rough handling and accidents undoubtedly varies more or less in accordance with the character of the work performed in the mine. European practice shows that about 0.1 per cent. of all lamps per shift are lost in this manner.

The incandescent-lamp renewal already has been expressed in figures, in connection with the reliability of service. Excellent results have been obtained, the average life of the lamps being approximately 1000 hours.

The Electric Lamp Has Yet to Cause a Mine Explosion

From the lamp designs and the lamp service as described above, it can be seen that the development of the portable electric mine lamp has made rapid progress during the last few years, and since, up to this writing, no explosions have occurred wherever installations have been made, it can be said without exaggeration that the electric mine lamp is a success and that it is bound to be adopted more and more.

Of course, as is the case with any new appliance, objections have been raised against the electric mine lamp, and especially for the reason that it does not detect inflammable gases as does the Davy lamp. There is no doubt that this detail will be overcome in the near future, as there are several principles which can be used for the construction of mine-gas detectors. In fact, the German government only lately has ordered several hundred of these devices, constructed in accordance with the directions of Dr. F. Haber, on the acoustic principle and known as "mine-gas whistles." These will be distributed to the various mines for a thorough trial.

Wilkes-Barre District Mining Institute

The seventh annual banquet of the Wilkes-Barre District Mining Institute was held at Irem Temple, Wilkes-Barre, Penn., Wednesday night, May 6, and more than 1100 men who are interested in the mining industry and the production of coal were present. The banquet was one of the most successful the Institute has ever conducted and it brought the various members together in a spirit of friendliness that will have a great effect in keeping the ranks solidly built.

The members and guests assembled at the Y. M. C. A. auditorium in the evening and at 7 o'clock they formed a line and marched to the magnificent home of the Masons and Shriners, where a dinner was served. The catering was splendid when it is taken into consideration that the crowd was so large.

The dinner over, Thomas H. Williams, general manager of the Kingston Coal Co., called the banqueters to order and Dr. Charles E. Guthrie, pastor of the First Methodist Church, delivered the invocation. President Williams, in opening the after-dinner speaking, gave a short history of the Institute and the things it has accomplished. He urged upon all those who are interested in mining to avail themselves of the opportunities of the Institute and better prepare themselves for a study of underground conditions and for a practical, systematic manner of dealing with mine problems.

After-Dinner Speeches

Judge J. Butler Woodward, of the Luzerne County courts, was toastmaster, and he opened his remarks with an interesting comparison of the science of engineering and that of law and medicine. He called upon Judge P. A. O'Boyle, also of Luzerne, as the first speaker of the evening. Judge O'Boyle paid a splendid tribute to the anthracite miner and then drifted off into a patriotic address in which he declared that he hoped the American flag would wave from the capitol of Mexico and that it would remain there.

Former Judge Benjamin R. Jones, of Wilkes-Barre, was the next speaker, and he paid a fine tribute to the mining institute as the means of promoting harmonious relations between officials of the coal companies and their employees. He urged men to become members of the Institute and better conditions for themselves and their employers by taking up the splendid course in mining.

Fourteen Men Graduate

President Williams then called 14 young men to the speakers' table and presented them with certificates showing that they had successfully passed a three-years' course in mining at the Institute. He also presented each young man a check for $24, which represented the amount of money he had paid as tuition. The following received certificates: Thomas E. Jones, Llewelyn Jones, William L. Davis, John L. Picton and Patrick Mangan, all of Plymouth; Edward P. Davis and William D. Thomas, of Edwardsville; Michael Boland, of Swoyersville; Isaiah Kershaw, of Larksville; Richard Bowena and Jacob Urban, of Plains; Frank J. Carter, of Forty Fort, and Richard Lewis and Edward Roberts, of Wilkes-Barre.

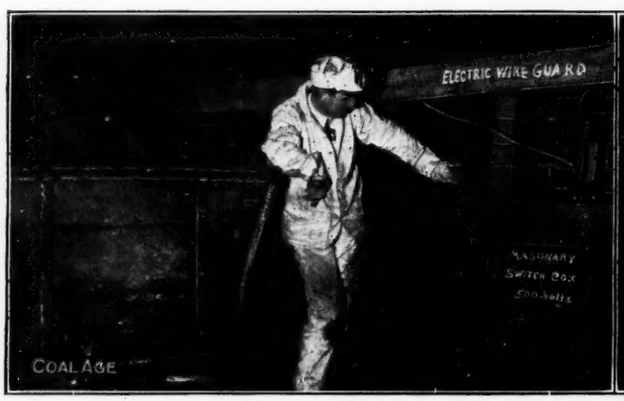
During the evening solos were rendered by Prof. E. E. Griffith, Roger Howell, Prof. D. H. Lewis. The Institute quartette, composed of John W. Griffith, Thomas W. Morgan, Richard Morgan and John Mason, also rendered several selections. The benediction was pronounced by Dr. T. C. Edwards.

The officers of the Institute are: President, Thomas H. Williams; first vice-president, H. G. Davis; second vice-president, James J. McCarthy; secretary-treasurer, F. M. Devendorf. The board of directors follows: Thomas Thomas, Samuel R. Morgan, Charles Enzian, Benjamin D. Amos, P. H. Devers, Thomas H. Price, M. J. Flaherty, Thomas Martin, G. William Edwards, J. S. Hammonds, E. J. Newbaker, Lewis J. Davis, Gilbert S. Jones, Thomas J. Williams, A. L. Williams and Thomas A. Evans.

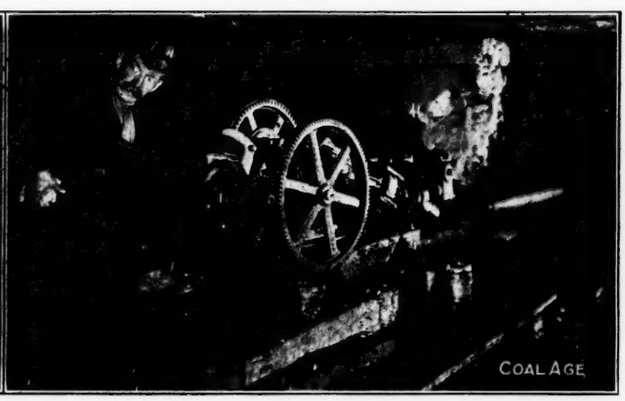
Safety Precautions in Mines

Showing Method of Protection against Electric Shock from Machine and Light Wires by Board Guards Nailed to Pegs Inserted in the Roof

Boards Suspended from Hangers to Protect Electric Trolley Wires. Photo Also Shows Signboard at Intersection of Entries Pointing Way Out

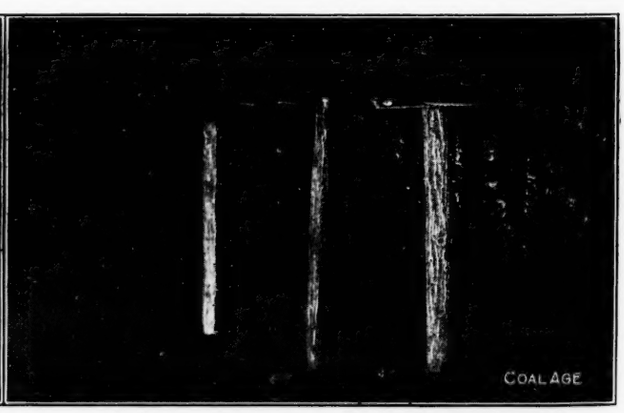


Switch Box Built into Coal Seam with Brick and Cement to Protect against Mine Fires. Also Shows Board Guard to Protect Trolley Wires



This Shows a Condition Common in Many Mines. An Electric Pump Has Been Installed with All Gear Wheels Entirely Unguarded

"Draw Slate" Overlying the Coal Seam. The Picture also Illustrates an Incorrect Method of Posting

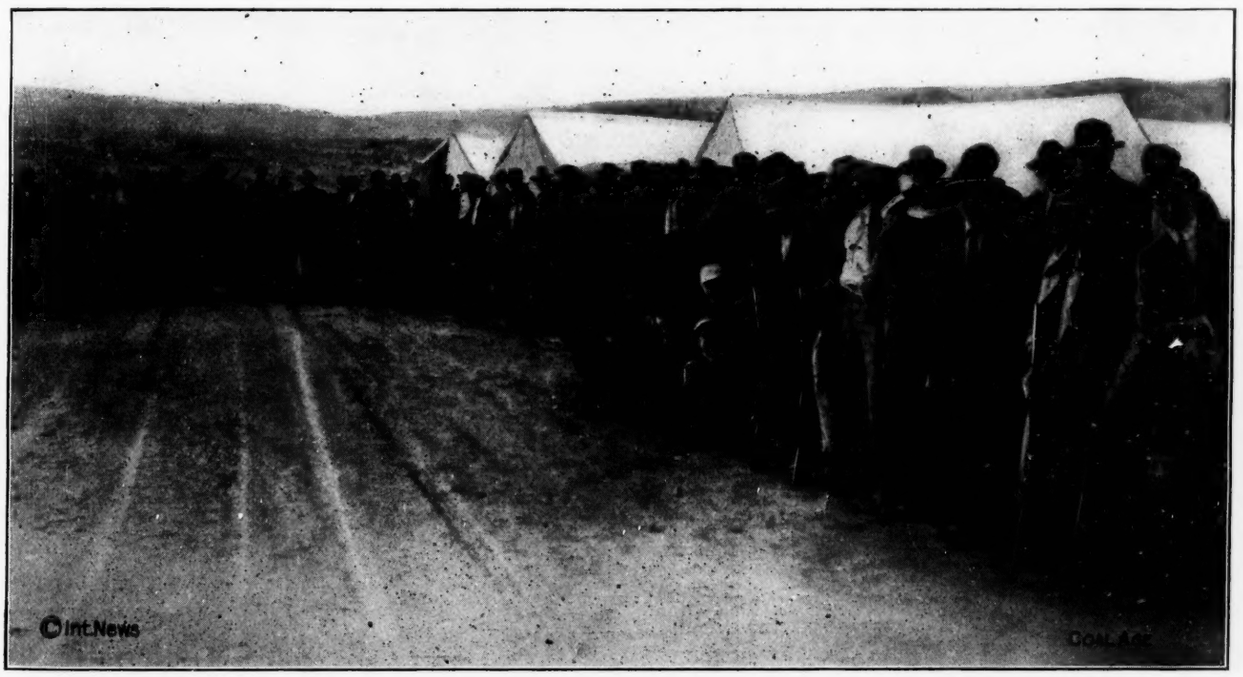


This Photo Indicates Plainly Just How the Miner Should Post a Dangerous Piece of Draw Slate Overlying a Coal Seam

The Colorado Strike

SYNOPSIS—The interest in the situation shifts from the battlefield to the state capitol. Peace continues, but what will happen if the regulars are removed seems uncertain. The action of the United States Government is simply to restore the conditions of affairs prior to the Ludlow battle. Mines then working are allowed to work, miners then in the district are permitted to remain, but the mines must continue at rest and all new arrivals must leave and none enter the strike zone.

The issue of last week passed rapidly over the Ludlow battle, omitting many important details which have since come to hand It is, therefore, desirable in the interest of truth to supplement the account then made. The military board, comprising Judge Advocate Major E. J. Boughton, Captains W. C. Danks and Philip S. Van Cise, of the Colorado National Guard, makes a long report of the occurrence. It declares that they examined under oath as many as possible of the soldiers, deputies, mine guards and townspeople of Ludlow and nearby coal camps. They made a personal request for testimony of J. R. Lawson and J. McLennan, of the United Mine Workers of America, but they, in the presence of their attorney, H. N. Hawkins, refused to give evidence on the ground that the inquiry was not publicly conducted.



GROUP OF ARMED STRIKERS AT TRINIDAD, COLO.

GREEKS USED PRESENCE OF WOMEN AS DEFENSE BUT KEPT THEM OUT OF DANGER

The military board condemned the operators for having introduced lawlessness in the persons of "ignorant, lawless and savage Southern Europeans." They declare that the Greeks deliberately prepared for battle, and from the report it may be gathered that the Greeks desired to fire on the militia from the camp, hoping that the fire would not be returned because there were women and children living there. To protect these noncombatants, however, they constructed shelters or pits for some of them and removed others before opening fire on the militia.

The board declared that the Greeks intended on the Greek Easter to open fire on the militia, but they were too drunk at that time to prosecute their scheme. The attack was then to be made on Tuesday, but the moving of the militia from Cedar Hill to Water Tank Hill made the strikers believe that an attempt would be made by the militia to attack the camp and secure the person of Carindo Tuttoilmando, a nonunion miner who was held prisoner in Ludlow camp. Corporal Patton, in fact, according to the official report of Major Hamrock, was sent to make the demand of Louis Tikas.

Hamrock's report to General John Chase says in part:

He refused to see me under any circumstances. I phoned Lieutenant Lawrence to bring the Cedar Hill detachment to drill. Louis must have tapped the wire for he telephoned he would meet me at the railway station. Lieutenant Lawrence reported with detachment and machine gun. On the way I ordered him to assemble and drill in the vicinity. Then Louis arrived, and I saw 300 armed men leaving the colony and going south, while the women and children took cover in an arroyo to the north. I told Louis to get control of his men, and he agreed and went back to the colony. I ordered Lieutenant Lawrence to take a position on Water Tank Hill on the southeast, and then saw Louis with a field glass and gun in hand signal the men in the colony to take cover in the northern arroyo.

PUT LINE OF RIFLE PITS AROUND CAMP

The commission says:

We find that in apparent anticipation of the battle of Ludlow, rifle pits were prepared by the Greeks on the south and west side of their colony, along the country roads and close to the tents. These rifle pits show conclusively the careful and deliberate preparation of the strikers for the battle; and the location of these pits along the front and side of the colony nearest to the militia camp was such that when used they could not be defended without firing into the colony. Such care had the strikers themselves for their women and children that these pits were located where any return of the fire from them would be drawn directly into the colony itself.

Major Hamrock tested his range with the machine guns and sent them directly into the first tents of the colony. It could not be supposed that any women, children, or other noncombatants remained in the camp itself. They had been seen departing early in the morning, and it was impossible to believe that the strikers would draw the fire of the opponents from all sides into the colony if any women and children remained there.

THE RESCUE OF THE WOMEN FROM THE BURNING TENTS

As one tent caught fire after another, some of the men having nearly reached the tent colony heard the screams of the women and called to the men whom they saw firing from the tents to get their women out. The only answer was the words: "You go to ——," spoken with a foreign accent and accompanied by a rain of shots.

The men in the colony being driven back and the presence of women thus being known, Captain Carson, Lieutenant Linderfelt and other officers and men made a dash in among the burning tents for the purpose of rescuing the women. At first they took several women from the tents, some of which were burning and some not. They then dis-

covered subterranean pits beneath many of the tents, and some of them were stored with human occupants.

When the pits were discovered, the difficulty of getting out the women and children increased. Lieutenant Linderfelt took a woman from one tent who could not speak English. She made him understand he must return. She went back with him and indicated one of the holes in the ground, from which the lieutenant took two little children in the nick of time. Captain Carson related that when he was in an apparently open-floored tent he heard the crying or whining of something living beneath. He had to chop away the floor, which was nailed down upon these people, to get them out.

BRAVERY OF MILITIA

During the whole time that this rescue work was going on the colony was under fire, and by taking the greatest risk of destruction by making targets of themselves in the light of the burning tents, the uniformed militia did its noteworthy work.

We find that the work of rescuing some 25 or 30 women and children by Lieutenant Linderfelt, Captain Carson, and the squads under their command, was under all the circumstances truly heroic and must stand out boldly in contradistinction to the abandonment of the helpless women and children by their own people, and the subsequent efforts to kill their rescuers regardless of the safety of the rescued.

DOUBTFUL IF WOMEN AND CHILDREN WERE SUFFOCATED BY FIRE

It was supposed by the officers after a thorough search of the colony that all the remaining women and children had been taken out. The event proved that one of the pits had been missed in the search. In this pit was discovered two women and eleven children, all dead. This chamber of death measured in feet, 8x6x4½. When found it was almost closed. If these women and children were placed in this pit at any time during the morning, it is our belief that they died of suffocation hours before the pit caught fire.

We find that the tents were not all destroyed by accidental fire. Men and soldiers swarmed into the colony and deliberately assisted the conflagration by spreading the fire from tent to tent. Beyond a doubt it was seen that the fire would destroy the whole colony. This was accompanied by the usual loot. So deliberate was this burning and looting that we found that cans of oil found in the tents were poured about them and the tents lighted with matches.

GREEK ACTIVITY RESENTED BY TENT COLONY

We find that the dominant feeling among the refugee colonists on Monday night, and before the second thought came to them or was suggested to them, was resentment toward the Greeks for starting the battle. This resentment prevailed even over their animosity against the soldiers, but the incident was later made a candle to inflame the minds of these deluded men to the acts of slaughter and rapine that followed throughout the state.

It was made the excuse of many bold and defiant utterances and acts of treason against the state by certain union leaders, who had the opportunity by their influence and authority to prove themselves really great and good men, and worthy citizens. Instead, by all means of exaggeration, incendiarism, and treasonable practices, they made of the battle of Ludlow a means of organizing a real rebellion with its attendant awful consequences.

COMMISSION NONCOMMITTAL AS TO CAUSES OF TROUBLE

We do not presume even to hint where the ultimate responsibility lies in the present strike. It may be that the coal operators or the union are wholly to blame for the conditions that have made such results possible. It may be that both sides are partly at fault. But the conditions have been brought about and being actually existent, whatever may be the cause, we feel that for their treason and rebellion against organized society, with the horrible consequences of anarchy that followed, certain union leaders must take the responsibility before God and man.

MILITIAMEN READY TO OPERATE MACHINE GUN, LUDLOW, COLO.

DEATH OF THREE PRISONERS

The report also says that during the evening, Louis Tikas, James Filer and an unknown striker were taken prisoners. Lieutenant K. E. Linderfelt swung his Springfield rifle, breaking the stock over the head of Tikas. This incident followed a heated controversy between the lieutenant and the Greek. The report continues:

An attempt to hang Tikas went so far that a rope was produced and held over a telegraph pole. This lynching was prevented by Lieutenant K. E. Linderfelt, who turned Tikas over to a noncommissioned officer, whom he directed to be responsible for his life. Shortly after, all three prisoners were killed by gunshot wounds. The only bullet found in Tikas' body was of a kind not used by the soldiers, although two other wounds may have been made by Springfield rifle

bullets of the uniformed men. When the colony was looted by participants and spectators in the battle, it was found that 15,000 rounds of ammunition were stored in a tent marked "Headquarters of John Lawson."

SNYDER, THE NONCOMBATANT, SLAIN BY STRIKERS ACCIDENTALLY

Only one person was killed or wounded in the colony by gunshot; Frank Snyder, a 12-year boy, was shot in the head. His father stated that he thinks that his boy had gone outside the fence and was shot in the forehead while facing the arroyo from which the strikers' fire came.

The colony was not swept by machine guns. This is proven by the fact that the chicken houses, outhouses, tent frames and posts still standing in the colony exhibit no bullet holes; while the buildings and fences along the railroad tracks were riddled by the machine guns.

The report also makes the statement that the militia was frenzied as the result of the discovery of Private Martin's body severely mutilated, and that this discovery may have accounted for some of the things which took place later near the tent colony itself. Hockersmith and Chavez, both privates, were also horribly mutilated.

THE LEGISLATURE

The meeting of the Colorado Legislature on May 4 was addressed by Governor Ammons. He stated that he had been obliged to borrow money at 4 per cent. to pay the militia.

MAJOR HOLBROOK, COMMANDING THE U. S. REGULARS IN COLORADO'S STRIKE ZONE

This had to be done at a time when neither the country nor the state was in good financial condition. So the clearing houses at Colorado Springs and Pueblo were asked to supply the money, and thereby exhibit their sense of good citizenship. But before the clearing houses could consider the matter, the auditor sent word that he would not agree to pay the certificates.

The militia, however, was ordered to take the field, and when it came to the payment of the first certificates, they were not issued; the governor was, therefore, compelled to go into the Supreme Court and ask that body to order the auditing of the bills and the issuance of the certificates, which was done. The banks of three cities are carrying $250,000. The railroad agreed to carry theirs until the legislature provided for payment, and some patriotic citizens also agreed to wait.

The governor urged the passage of an arbitration bill and of one establishing a constabulary like those already in existence in Nevada and Pennsylvania. The governor states that the militia has been unable to do effective work because it cannot legally stop the importation of arms, or disarm the gunmen of the strikers and others or close the saloons. There seems some degree of disingenuity about this statement. Surely when a governor declares martial law the authorities in control can regulate such matters without circumventing recognized military practice.

AMMONS WINS IN ALL CONTESTS IN LEGISLATURE

On May 7, the progressive democrats and progressives in the Senate placed on record a resolution condemning the Ammons' administration for failure to control the situation, and the House failed to pass a resolution asking the governor to extend his call for a special session, so as to permit legislation on the entire strike situation. On May 8 a resolution was introduced by Representative Bliss in the State House, providing for an investigation by five members of that body, having power to subpoena and compel the attendance of witnesses.

MONEY VOTED BUT CONSTABULARY BILL NOT PASSED

A bill was passed empowering the governor to close saloons in the strike zone. This was opposed by the progressives, merely for the purpose of determining the strength of the contending parties in the legislature. The constabulary bill was killed by common consent, it being realized that it would imperil the Democratic party to pass it. The Senate also turned down a resolution appealing for Federal arbitration of the strike war. The House on May 11 passed the third reading of the bill, providing a $1,000,000 bond issue to pay for past, present and future expenses of the state militia in the strike field.

WOMEN HAVE DECIDED THE ISSUE AND WILL SEE THAT GOVERNOR OBEYS THEM

The Colorado Women's Peace Association, led by Mrs. Alma V. Lafferty, threatens with 5000 women to camp on the capitol grounds if the militia is called out again. We sincerely hope with them that he will not do so as long as the United States troops can be induced to remain. However, the hysterical plans of these women enable us to size up the whole Colorado situation, which is not marked by reason, but by sentimentalism.

The miners are somewhat slowly giving up their guns. They have been made to believe that as soon as they surrender them the mine guards will attack them savagely. Hoping that the coal companies may soon be short of men and that miners may leave, some of the leaders are doubtless not overkeen in their favor of disarmament. When guns are available for picketing purposes, it will be hard to bring new men into the district to replace those who may leave.

MARTIAL LAW RULING

The operators are slowly surrendering their arms, though their position is precarious. Should the troops leave before the strikers are disarmed, the loyal men and the companies would be apt to lose both life and property. With the present administration, nothing can be foretold.

In fact, the present rulings of Secretary of War Garrison are most unfair. He forbids the opening of any mines which were idle before the Ludlow affair and forbids the companies to take on any new men. We are trying to encourage trade in Vera Cruz, Mex., and suppressing it in Trinidad, Colo. On the other hand, the government is endeavoring to drive out all those armed men who came into Colorado after the Ludlow battle to terrorize the country. Every man has to give the name of his former working place, and if on inspection of the pay-roll his name is not to be found, he is to be summarily removed from the state. It is obvious that this latter provision will not be enforced against the law-abiding.

It is also difficult to determine why the Federal troops are going to permit the rebuilding of the Ludlow camp. This camp should be removed to some place where violence is less likely to be attempted. Even though as reported, the colony will have its membership restricted, there will always be a danger that it will be put to the use for which its location fits it and will be converted into an armed camp.

Itinerary of Federal Rescue Cars

Car No. 1

1914 Arrive	Leave	Address
May 16	May 24	Seattle, Washington
May 24	June 4	Roslyn, Washington

Billings Car No. 5

1914 Arrive	Leave	Company	Address
May 18	May 23	Car Repairs	Spokane, Wash.
May 25	May 30	Bear Creek Coal Co.	
		Montana Coal and Iron Co.	Bear Creek, Mont.
		International Coal Co.	
June 1	June 6	Anaconda Copper Mining Co.	Washoe, Mont.
		Smokeless and Sootless Coal Co.	
June 8	June 13	Northwestern Improvement Co.	Red Lodge, Mont.

Editorials

A Special Anthracite Number

The June 6 issue of COAL AGE will be devoted entirely to anthracite mining. Much of the information in this particular number will be applicable to soft-coal operations, and therefore will be of interest to bituminous men. We especially request that our readers in the anthracite field submit articles describing mining methods, ventilation, pumping, haulage, etc., in the hard-coal mines.

All such articles as are accepted will be handled promptly and paid for at a liberal rate. Join in and help us make the June 6 issue of COAL AGE the most interesting compilation of anthracite information ever published in a single copy of any paper.

The One Thing Needful

It has been said that the model mines are those which most frequently blow up. The most notable of our mines are approached by shafts. Only a strong operating concern can afford to sink a deep pit and equip it with machinery, and such a company is likely to plan the colliery in the most expensive scale.

It is also true that shaft mines have a record for explosions, which is out of all proportion to their numbers. Because, therefore, shaft mines are at once best equipped and most dangerous, the dictum as to the danger of model mines has almost been regarded as an adage. As a rule, gas is generated in their workings and they are usually somewhat warmer and therefore drier than drift mines. But the presence of gas is the important characteristic which makes shafts dangerous. Model mines are not as dangerous in the anthracite region as are others, because nearly all are shaft mines and contain gas. The best mines and the worst in that district are subject to the same class of risks and accordingly the better mines have the clearer record for safety.

It was almost certainly the presence of gas in Eccles No. 5, which caused the violent explosion at that colliery. The mine was really model—in its discipline, its equipment and its morale. But there were a few things needed and all the multiplicity of precautions failed for want of these few things.

Every department of industry relies on all the elements of success, or it will be a failure. It is useless to build a railroad and equip it splendidly, leaving, however, one broken rail. And it is a mistake to provide elaborate ventilating equipment, fans, stoppings, overcasts and canvas more than ordinarily complete, and then to use open lights, electric haulage, and let the miners fire their own shots.

The mine safety in that event depends as at Eccles, wholly on the ventilation. The operators at that mine staked everything on that thin line of defense. They saw to it as far as they could that that one line was perfect, unbreakable, but apparently it broke and the flame was there to blow the mine up. They had provided that flame, trusting it would have no gas to ignite. But they could not assure the absence of the gas should the ventilation for one moment fail.

This is a time when drastic measures are sure to be put in force. By compensation laws such losses as that at Eccles will be distributed among the operators and these men will combine to enforce greater safety on every one. In a short time it will not be possible to work a gaseous mine with an explosive dust like that at Eccles without safety lamps. In the report of 1912, the inspector says: "This mine liberates gas in all working places." The other operators in West Virginia cannot continue to let mines so gaseous as this be operated with open lights, if they are going to be partners with such mines in providing compensation.

No. 5 Eccles was an admirably managed mine. Read what the Department of Mines has to say: "Posting in rooms is done by timbermen; shot-firers are employed; Monobel powder is used exclusively. The mine is damp throughout. All stoppings are of brick or cement." All these statements are true except that the shot-firers only fired the shots for machine-mined coal, which least needs such care. In fact, the report understates rather than overstates the care shown by the management in the operation of the mine.

The men working were satisfied and so were the managers. Even the vice-president and general manager, F. Guiterman himself, was willing to make a monthly trip into the workings. He was ready to expose himself to equal risk with his men. But the few things needed were not done, and it is a folly to say that we are surprised at the result.

We ask those who fear to admit, by introducing safety lamps, that their mines are dangerous, to think carefully. If their mines blow up, there will be more than their admission to advance the notion that the mine is a dangerous operation. They will have to fight thereafter not only the fear and dislike of safety lamps, but the dread inspired by the history of a mine which, in its time, has slain its hundreds.

Proposed Oriental Legislation in Colorado

The Colorado Progressives have a remarkable program of reform which proceeds on the basis of oriental law, that anyone guilty of the slightest infraction of a statute should be adjudged as worthy of total deprivation of property.

They also would provide that the right of determining guilt should be placed entirely in the hands of one person for determination, who was not at the time he prepared the decision cognizant of the importance of the issues he was determining. This program is a conclusive proof that if Governor Ammons and his followers are to be reprobated, his opponents in the legislature are also to be regarded as men of neither judgment nor principle.

In fact, the legislature of Colorado is conspicuously unworthy of public esteem.

The Progressives demand changes in the state laws governing the leasing of coal properties, so that the state may compel lessees, under pain of forfeiture of leases, to comply with all safety regulations to save lives in mines; that the state shall say who shall be employed in mines, that forfeiture of leases shall include forfeiture of improvements; that all present lessees who are proved guilty of violating state statutes for safety in mines shall be deprived of their rights, the report of the state inspector in the last two years to decide this point; that the state shall reserve the right to fix the price of coal to consumers making the price to cover the cost of mining, transportation and sale, with a small profit to the operators. The Progressives also declare that the present royalty of 10c. per ton for coal mined on state lands is not enough.

In such ridiculous propositions the legislators waste their time while foreigners in hordes overrun their state with arms, tying men down to the floors of houses and setting fire to them, hitching mules to the number of 28 in a barn and firing the building, taking prisoners, clubbing, shooting and murdering better men. The Progressives have nothing more valuable to say than that if any operator has let a portion of his mine get dry during the last two years, or has failed to put a shelter hole at a certain definite distance from its neighbor, his property shall be confiscated by the state. We do not wonder with men like this to misrepresent the people that feeling runs high in Colorado.

Government Mine at Williston, N. D.

We are by no means ardent friends of such capitalism as does not serve the interest of the public. Conversion of most of us to all forms of state socialism would be comparatively easy could we be convinced that government ownership was economically sound and would give a higher return for the labor rendered, that it would promote safety in operation and be anything else than an unstimulating system under which all would live on a lower plane.

In a quiet way the reclamation service has opened a mine at Williston, N. D. This department of the United States Government, like all the others, is free from graft and has had a reputation of being free from sterility and sluggishness. Many works it has accomplished have added to the wealth and been creditable to the enterprise of the nation. So we do not single out a discredited graft-ridden organization in order to condemn state ownership when we discuss the achievements of the reclamation service in coal mining.

The mine which the service is working is small; in fact, in ordinary parlance, it would not be called a mine, but a "country bank." There are only 12 or 15 men employed, but six to ten tons are mined by each miner. So the coal must be thick and conditions favorable.

The rate of pay is reasonable and runs, we are told, from 60 to 80c. per ton, according to the location. The pay per working day on the surface is $1.75, and underground $3. All these figures are like those paid in the coal regions throughout the United States, though probably the miners in central Pennsylvania, where they have been trying to increase the pay of outside workers, would strongly object to such differences existing between daylight and dark.

Now with a small mine, with favorable conditions, with a wage scale not high but about that obtaining in Pennsylvania, Illinois and Ohio, the reclamation service produces coal for $1.78 per ton, "including all maintenance charges."

The average price of bituminous coal at the mines throughout the United States was $1.15 in 1912. So, if the reclamation service had to go out and do business in the markets under the average conditions, it would lose 63c. on every ton of coal mined, or 35 per cent. on each sale.

The writer, Raymond W. Pullman, on whose report we rely, states: "Of course, Uncle Sam can't do anything, and when he does, he always makes a failure of it. This coal mine and the reclamation service are proofs of things, don't you know." Indeed they are, Mr. Pullman, indeed they are.

The Court of Public Opinion

We are approaching a crisis in the industrial conditions of America, and the coal industry has apparently been selected as one of the principal battlegrounds on which the conflict is to be waged.

We have had actual civil war in both West Virginia and Colorado, and the contending factions have resorted to a show of force rather than an appeal to reason.

We doubt if violence is a good substitute for logic, and we are sure that if the same amount of money and effort, now being expended by organized labor in Colorado, was to be used in a broad campaign of public education, whatever wrongs exist would soon be righted.

Have we reached a point in our business life where each man who is not satisfied will exert physical force to correct the ills that beset him? Are we coming to a state where we must smash something every time we want a raise in wages?

Capital and labor must soon learn that the one court of last resort is public opinion, and they must know that no unjust condition can withstand for long this force of public thought.

Every social movement based on intimidation and violence has been doomed to failure before it was well started. The "Molly Maguires" tried physical force 40 years ago and failed, and every campaign of lawlessness and bloodshed since then, including that of the suffragettes in England, has been equally unsuccessful.

We hold no brief for the mine owners. Some of them are as unjust and selfish as employers can be. May speedy retribution come to them and may they and the rotten conditions they stand for be banished forever.

The coal industry is filled with enough earnest, honest, Christian men to conduct its affairs on a plan of social justice to the employee, and equal fairness to the capital employed.

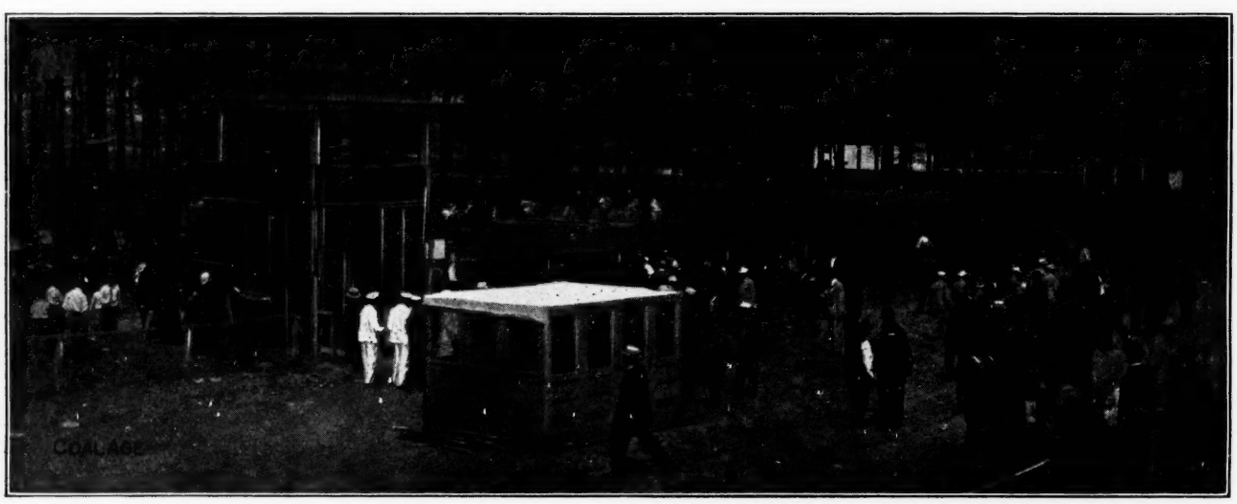
The time has arrived when employer and agitator alike must stop exploiting the decent workingman, who is aiming to get a fair wage for an honest effort. Most of our social ills could be avoided by submitting all differences to "public opinion.," the one and only court that can be depended on certainly and finally to exercise justice to all.

Sociological Department

Saline County Mine Safety Association Meet

Saline County, Illinois, held its first annual first-aid contest at Harrisburg, Ill., on Saturday, May 2, under the auspices of the Saline County Mine Safety Association. Every effort was made by the officials in charge to make the event a success. How well they succeeded could be easily told from the satisfied expression worn by both members and visitors when the event closed. As the weather was most favorable and the contest well managed, fully six thousand spectators attended and all remained till the proceedings ended.

At ten o'clock in the morning, the officers of the Saline County Mine Safety Association, followed by the first-aid teams which were to take part in the contest, and the members of the association, formed in line on South Main Street and marched around the square to the Interurban line, where cars were ready to take them to the White City.



View of First-Aid Field and of Imitation Mine for Exemplification of Rescue Work

After a selection by the Harrisburg Union Band, M. S. Whitley, master of ceremonies, introduced O. M. Karraker, mayor of Harrisburg, who in an interesting and appropriate address welcomed the crowd to the city. H. H. Stock, dean of the department of mining engineering of the University of Illinois, was next introduced, and in a brief address told of the origin of first-aid work and the benefit derived from its introduction.

An Exhibit of Safety Work

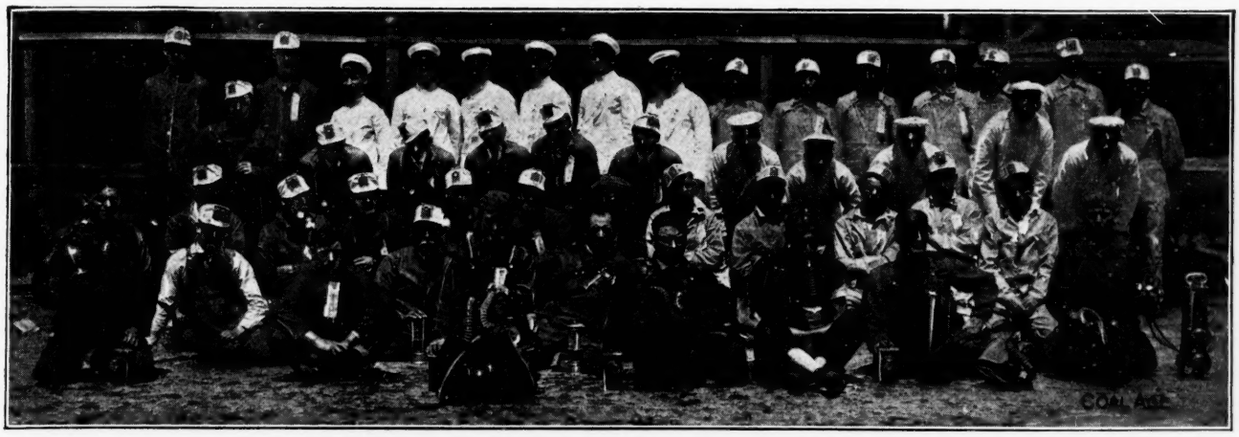
A most interesting and well-planned exhibition of mine rescue work was then performed. A mine entry had been constructed opposite the grand stand, representing four rooms and an entry which was several feet in advance of the inner room. The spectators were informed as to the movements of the men in the mine by George W. Riggs, of the U. S. Bureau of Mines, who acted as announcer during the day. First the examiner, equipped with testing rod, safety lamp and anemometer, entered the mine, marking the dangerous roof, testing the rooms for gas, and measuring the air current with the anemometer, and making his report of the condition of the mine to the manager, who arrived just as the examination was completed.

Next the miners appeared ready for work, reporting to the mine boss, and being checked in by him. The miner in Room 4 was cautioned not to enter his place until an accumulation of gas found in it by the examiner had been removed and the place made safe. After considerable discussion, the machine men succeeded in getting the bit boy to bring in the bits for the machine, and they began work cutting the face of Room 1. In the meantime, the timberman had received his orders from the examiner, and had gone about his work, supporting the roof where necessary, and taking down such material as was dangerous.

Exhibit of Carelessness

The tracklayer, after a more or less social visit with the miners in each chamber, finally reached Room 4, where he and the miner in charge of the place were soon engaged in a heated discussion as to the relative position of the track and the face, the miner claiming that he was unable to load his coal because the track was too far back, and the tracklayer asserting that he had laid track in that room just the day before. The discussion finally became too hot, and, forgetting all about the danger sign across the entrance to the room, the two men started up to the face to prove who was right.

A moment later, an explosion was heard, and dense smoke began to pour out along the entry. The miners working outby from Room 4, hearing the explosion,



FIRST-AID CONTESTANTS AND HELMET MEN AT HARRISBURG, SALINE COUNTY, ILLINOIS

rushed in to give assistance, and were themselves overcome by the smoke. Some of them were rescued by their comrades, for those who were uninjured, finding the smoke and afterdamp too bad, sent in a call for the rescue team. Two automobiles soon arrived, bearing the rescue men and their equipment, and after testing the apparatus in the smoke room on the surface, the rescue crew entered the mine, carrying a life line, stretcher, and electric lamps.

The two men who were overcome by the explosion and afterdamp were soon discovered, and on being brought to the surface, were turned over to hastily organized first-aid teams, which administered to them until the arrival of the ambulances. The entire demonstration was realistic, and received such enthusiastic applause that the officials decided to repeat the performance in the afternoon, so that all might have an opportunity to see a mine-rescue team at work. Following the exhibition, an adjournment was made for dinner, and at half-past one in the afternoon, the first-aid contests were called.

FIRST-AID WORK

The first event was the single-man contest, and believing that this is by all odds the most important event, the Judge-in-Chief, Dr. A. F. Knoefel, made the problem for this event a rather hard one. When a man is injured, there is often but one man in the neighborhood who is capable of administering first aid to him, and as a consequence, it was thought that the best measure of a man's ability is his work in the single event. There were 26 men entered for this contest, and the problem given them was as follows:

> While two miners are engaged in mining with the machine, the coal falls from the face upon one who is shoveling slack, he being caught under the fall. The following injuries are sustained: Severe lacerated wound back of left knee with profuse hemorrhage; fracture of tibia and fibula of left leg in its upper third; cut of forehead; fracture of right arm. Time limit, 35 minutes.

The following men were entered in the event, and finished in the order given:

1. John Krainock, with Charles Elliott as subject. Bunsen Coal Co., 93 per cent.

2. John Griffiths, with Matthew Dewar as subject; Big Creek Coal Co., and James Struthers, with Dan McLaughlin as subject; Superior Coal Co., tied with a percentage of 92. To decide this event, a final test was given to these two men, the second and third prize depending on the result of the final. The problem given was to "put on a skull-cap dressing of the head," and in this John Griffiths made a mark of 95 per cent. and James Struthers made 94 per cent., giving them second and third place, respectively in the single event.

4. James Weir with Robert Weir as subject; Superior Coal Co., 91 per cent.

5. Three men were tied for this position: Steve Gosnell, with Michael McTaggart as subject; O'Gara Coal Co.; T. B.

FIRST FIVE CONTESTANTS IN THE ONE-MAN EVENT. THIRD MAN FROM LEFT IS JOHN KRAINOCK, WINNER OF FIRST PRIZE

Trigg with James Ford as subject; Big Creek Coal Co.; and William B. Griffiths, with A. Robasse, subject; Big Creek Coal Co., 90 per cent.

8. Two men were tied for eighth place: Bertram Peak with Frank Futrell as subject; Saline County Coal Co.; J. Estwanik, with Fred Creswell as subject; Big Creek Coal Co., 88 per cent.

10. Two men were tied for tenth place: John Lyons, with Peter Boland as subject; Madison Coal Corporation; No. 8 mine; and Charles Miller, with Sam Anderson as subject; Superior Coal Co., 86 per cent.

12. Three men were tied for 12th place: Oscar Horn, with Thomas Thornton as subject; Chicago & Carterville Coal Co.; John Cowden, with Wm. B. Orr as subject; Superior Coal Co.; and James Law, with Paul Henderson as subject; Saline County Coal Co., 82 per cent.

15. Two men were tied for 15th place: Steve Shaeffer with Jos. De Barba as subject; Bunsen Coal Co.; George Tincey, with George MacNab as subject; Saline County Coal Co., 81 per cent.

17. Two men were tied for 17th place: Earl Mitchell, with Carl Heine as subject; O'Gara Coal Co.; and Stephen Tovey, with C. E. Noonan as subject; Bunsen Coal Co., 80 per cent.

19. Wm. G. Taylor, with Joe Goff, Jr., as subject; O'Gara Coal Co., 79 per cent.

20. Two men were tied for 20th place: E. Parkins with Robt. Lanton as subject; Big Creek Coal Co.; and James Pepper, with William McNab as subject; Saline County Coal Co., 78 per cent.

22. Charles Cathcart, with John Cathcart as subject; Saline County Coal Co.; 72 per cent.

23. Robert Henderson, with James Long as subject; Saline County Coal Co., 71 per cent.

24. Two men were tied: T. F. Bailey, with D. H. Wilson as subject; Chicago & Carterville Coal Co.; and William S. Lang, with Daniel Simms as subject; Saline County Coal Co., 70 per cent.

26. Guy Biggs, with Oscar Peak as subject; Saline County Coal Co., 54 per cent.

Following the single-man event, the full-team event was called. The problem presented was:

Following a gas explosion, a miner who is in the entry sustains the following injuries: Second degree burns of the face, neck and forearm; fracture of the sixth, seventh and eighth ribs on the right side; fracture of the left thigh; also a fracture of the right patella. Perform artificial respiration, load patient on stretcher, carry and load in ambulance. Time limit, 30 minutes.

The teams and the order in which they finished were:

1. Superior Coal Co. Team No. 1, Gillespie, Ill. James Weir, captain; James Struthers, John Cowden, Charles Miller, Robert Weir. Field No. 2. 95 per cent.

2. Bunsen Coal Co., Westville, Ill. John Krainock, captain, Chas. Elliott, Steve Shaeffer, Joseph De Barba, C. E. Noonan. Field No. 5. 90 per cent.

3. Two teams were tied for third place, and the following problem was given to decide to whom the third prize was to be awarded: "In removing a prop, the miner was caught by a fall of slate, and sustained a fracture of the right clavicle, a dislocation of the right shoulder, and his right ear was torn off." The two teams tied were the Chicago & Carterville Coal Co., Herrin, Ill., and the Cuba first-aid team, Big Creek Coal Co., Mine No. 3, Cuba, Ill., with a percentage of 89. In the final the Chicago & Carterville team won third place, with a percentage of 98, the Cuba team scoring 82 in the final, and receiving fourth place. Chicago & Carterville team, Oscar Horn, captain, Harrison Wilson, Thomas Thornton, T. F. Bailey, Clark Miller. Field No. 8.

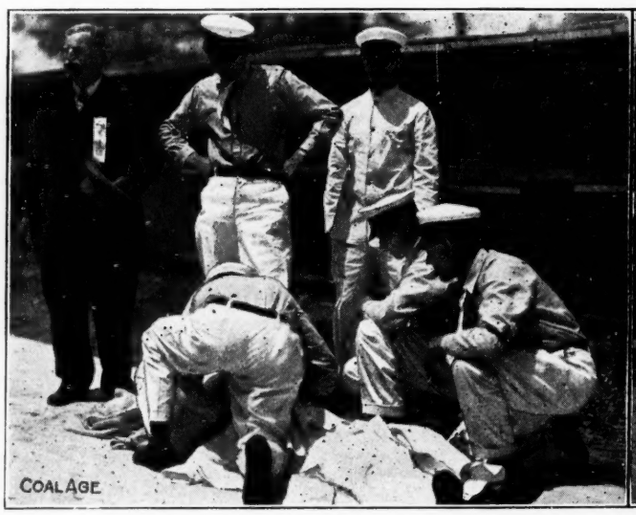
4. Cuba first-aid team, T. B. Trigg, captain, D. B. Griffiths, John Griffiths, Joe Estwanik, E. Parkins. Field No. 6.

5. O'Gara Coal Co., Eldorado first-aid team, Eldorado, Ill. Steve Gosnell, captain, Michael McTaggart, Joe Goff, Jr., Wm. Taylor, Robt. Taylor. Field No. 4. 88 per cent.

6. O'Gara Coal Co. No. 9 Mine, Harrisburg, Ill. A. Goodman, captain, C. Sprague, James Ford, E. Mitchell, Carl Heine. Field No. 9. 86 per cent.

7. Saline County Coal Co. Independents, Harrisburg, Ill. Geo. Tincey, captain, James Lang, William S. Lang, Robert Henderson, James Pepper. Field No. 1.; and Saline County Coal Co. Mine No. 3, Harrisburg, Ill. Charles Cathcart, captain, Bertram Peak, James Law, Guy Biggs, Frank Futrell. Field No. 3. 85 per cent.

9. O'Gara Coal Co. Mine No. 4, Harrisburg, Ill. Thomas Eddy, captain, Sherman Walters, Arthur Love, V. E. Pry, John Mead. Field No. 7. 84 per cent.



BUNSEN COAL CO., U. S. STEEL CORPORATION SUBSIDIARY, WON SECOND PRIZE

CHICAGO & CARTERVILLE COAL CO. TEAM, WHICH SECURED THIRD PLACE

OFFICIALS AND PRIZES

The officials of the contest were:

Judge-in-chief, Dr. August F. Knoefel, Terre Haute, Ind.; assisted by Dr. H. M. Orr, La Salle, Ill., and Dr. Frank Deason, Bush, Ill. Timer, D. B. McGehee, O'Gara Coal Co. Clerk of contest, J. R. Henderson, Saline County Coal Co. Scorers, Oscar Cartlidge, Illinois Mine Rescue Commission, and E. C. Lee, Illinois Miners' & Mechanics' Institutes. Announcer, George W. Riggs, U. S. Bureau of Mines. Marshall of the day, C. A. Horning, O'Gara Coal Co.

Following the announcement of the results, the prizes were presented as follows:

First prize in full team event, silver loving cup; presentation made by Hon. J. J. Parish. Each member of the winning team was given a gold medal, each member of the second team a gold medal, and each member of the third team a silver medal, the presentation being made by H. H. Stoek. Professor Stoek also presented the medal for the winners in the one-man event, gold medals being given for first and second place, and a silver medal for third place. In addition to the prizes given by the local association, American Mine Safety medals were awarded to each member of the winning team.

RULES OF CONTEST

The following rules governed the contests.

1. A team is composed of five men. Upon demand the members must certify that they are not doctors or trained nurses.

2. Each team must select its own patient from among the five members.

3. In team events the captain will control his team in its field work by giving audible commands.

4. No coaching or prompting will be allowed from the visitors or the patient.

5. Anyone desiring to participate in the event must file entry before noon of the day of the contest.

6. At the conclusion of any event the captain will raise his hand and announce his team number. The team will remain at its post until relieved by the judges.

7. Teams will bring their own first-aid materials, including bandages, splints, blankets, etc., and will not be allowed to leave the patient in order to secure materials.

8. The triangular bandages will be the standard used in the contest, but roller bandages may be used and equal credit will be given for their proper use as with the triangular bandage.

9. All splints must be prepared on the field for each event requiring their use. Specially designed splints may be used but they must be assembled during the time of each event requiring their use.

10. No practicing will be allowed on the field preceding the contest.

TREATING PATIENT FOR TRAUMATIC SHOCK IN ONE-MAN EVENT

DR. KNOEFEL EXAMINING JOHN LYONS IN SAME EVENT

11. The teams will be numbered consecutively, beginning at No. 1, and they will occupy their respective positions on the field.

12. Notice will be given before the beginning of the contest as to the number of teams assigned to each judge.

13. In all events requiring resuscitation, rescue of the patient and stretcher drill, the judge may require the teams to perform separately.

14. Each judge will mark the team number, event, and discounts for each team judged, sign his name and deliver his report to the recorder.

15. The recorders will foot up discounts and announce the scores to the judges. In case of a tie, the teams with the same scores will be compelled to participate in another event, those receiving the highest score in this event being accorded first, second and third places, respectively.

16. Time will not be an element, unless the team or men performing run over the allotted time, or fail to give proper treatment. All events shall commence and be finished at proper signal.

EVENING SESSION

At 7 p.m., a moving-picture exhibition was given in the Orpheum Theatre. Four reels from the Bureau of Mines were used, and after the first performance, W. D. Ryan, of the Bureau of Mines, was introduced by President Johnson of the local association, and gave a talk on mine safety. He was followed by H. H. Stoek, who gave a talk along similar lines, and then several slides showing accident prevention were explained by E. C. Lee. The program lasted until about 11 p.m..

Other guests at the exhibition were: Thomas Devlin and John Jeremiah, of the Illinois Mine Rescue Commission; Martin Bolt, James Forrester and John Bohlander, of the State Mining Board; R. Y. Williams and Clarence Bonnell, of the Illinois Miners' and Mechanics' Institutes; the entire force of state mine inspectors, and G. L. Morgan, T. P. Back, D. Z. Thrush, P. Hogan, J. Kaney, J. Garrity, J. McClintock, B. Roberts, W. Hartman, A. Frew and J. Starks. Dr. J. A. Holmes and J. T. Ryan, of the U. S. Bureau of Mines, were expected to be in attendance, but were called to West Virginia to assist in the rescue work at the Eccles explosion.

The officers of the Saline County Mine Safety Association responsible for the excellent showing made during the day are William Johnson, president; T. W. Johnson, vice-president; Bert Tavender, secretary; and Wm. R. Taylor, secretary.

The Rocky Mountain Coal Mining Institute

Owing to the continued unsettled conditions in the Colorado coal-mining industry, the executive board of the institute, by an almost unanimous vote, has also decided to postpone the next meeting of The Rocky Mountain Coal Mining Institute.

It was thought with an Institute such as ours that beneficial results could be obtained only by the hearty interest and coöperation of all the members belonging. Such interest and coöperation is hardly possible at the present time.

It is to be hoped that when the time rolls around for the November meeting, we will all be enjoying such a period of peace and prosperity that every member will find it possible to be in attendance.

E. H. WEITZEL,
President.

F. W. WHITESIDE,
Secretary-Treasurer.

Coming Meetings

The New York section of the **American Institute of Mining Engineers** will hold its final meeting for the year on May 21 at 7 p.m., at Brown's Chop House, 1424 Broadway. Following the brief annual meeting, a beefsteak supper will be served; price, $1 per plate.

The summer meeting of the **West Virginia Coal Mining Institute** will be held in Cumberland, Md., June 2, 3 and 4.

The annual meeting of the **Mine Inspectors' Institute of the U. S. A.** will be held in Pittsburgh, Penn., June 9, 10, 11 and 12, with headquarters at the Seventh Avenue Hotel.

The annual meeting of the **International Railway Fuel Association** will be held in Chicago, Ill., June 18, 19, 20 and 21, with headquarters at the Hotel La Salle, La Salle and Madison Sts.

Discussion By Readers

Overcasts and Stoppings in Mines

Referring to my article on Overcasts and Stoppings in Mines, COAL AGE, May 2, p. 718, I desire to state that when the walls of overcasts are more than 10 ft. 6 in. apart, it is well that the rails resting on the tops of the walls should be hitched into the coal ribs, to aid in resisting the thrust due to the weight of the roof of the overcast. The same result may be obtained by bracing the tops of the walls for 20 or 30 days.

A. W. HESSE, Asst. Chief Engineer,
The Consolidation Coal Co.

Fairmont, W. Va.

The Certificate Law

Letter No. 28—Referring to the interesting discussion on The Certificate Law, permit me to ask: Why not adopt the German system of education for mine officials, under which any mine worker between the ages of 16 and 35 years can go to the mine schools or "*Bergschulen*" and, after two years of study, if he passes successfully the third and last examination, he is given a graded certificate, which is good all over the Empire and in all countries on the Continent. Men who have passed the examination secure positions readily, as the demand and supply of certificated men are properly regulated. The men have the opportunity to show their ability; they are first placed among tried officials and thus given an opportunity to gain more knowledge; and as soon as they show themselves qualified they are given districts in the large mines.

The mines in the German Empire are divided into districts underground. Some have four while others have forty, while every "*steiger*" or deputy takes care of from forty to eighty miners and workers. He is with them for six hours every work day, giving instructions and taking observations with lamps and otherwise to see that the timbering, trackwork and excavations are properly performed in accordance with the law and regulations. This system is very satisfactory. The miner and the foreman have a fraternal feeling, one toward another, as the work is classed as craft or trade. The result is a system and it is profitable to the operator and the miner alike; and considering the size of the underground workings, they are as safe as human ingenuity and science can make them.

Compare this with what we have in the United States? From my observations in Pennsylvania, the Southwest, and in Colorado, for over 30 years, I find that every state has separate mining laws and regulations. In some states the candidate for the position of mine inspector must submit to an election at the polls; while, in other states, the governor appoints those officials. The examining boards often ask applicants questions they could not answer themselves without a reference book. As a result, many mine inspectors and mine foremen hold responsible positions, who would be more useful drilling holes and shoveling coal than trying to operate a coal mine.

Under this system, the mine foreman is held responsible for everything and has no protection for himself; he is paid less than the average miner, does twice the amount of work, worries and many a time loses his well earned rest at night. At the end of the month, the superintendent gives him a gentle (?) hint to reduce expenses and increase his output, but does not tell him how to do so, because he does not know how himself. He has hired the foreman to do this, while he draws the pay that the foreman should have.

HERMAN GEDOSH,
Civil and Mining Engineer.

Poteau, Okla.

The Air Factor in Mine Explosions

James Ashworth asks, COAL AGE, May 2, p. 741, where I can find any evidence of a "counter-current" in three experiments he mentions and in which an extraordinary or abnormal force was developed. I have no data regarding the experiments, No. 263 of the Eskmeals series and No. 287 of the Liévin series; consequently, I cannot express an opinion in reference to these two cases. I have, however, the data relating to Experiment No. 25 of the Altofts series and will say that although the record furnished affords no means of showing the probable presence of such a counter-current, neither is there anything in the record to show that a counter-current did not exist as an influential factor in creating the extraordinary explosive force developed.

Mr. Ashworth expresses the opinion that, in the above named experiments, "the speed of the explosive wave must have been far too great to allow of the operation of a reverse impulse such as I suggested in COAL AGE, Apr. 11, p. 603. In this connection, it is worthy of note that Experiment No. 13 of the Altofts series, which resulted in violence about equal to that produced in Experiment No. 25, shows that the existence of even a rather abnormal destructive force does not prevent the operation of a powerful reverse impulse. In the latter experiment No. 25, several steel sections at the gallery entrance were blown away. In Experiment No. 13 the steel gallery for a length of 30 ft. was blown up at a point 160 ft. inby from the entrance. In neither case was it possible to determine the pressure developed at these respective points; but it must have been exceedingly high in Experiment No. 13, because in Experiment No. 24 a pressure of 255 lb. per sq.in. was recorded at a point 294 ft. inby from the gallery entrance, and this was not sufficient to break the steel shell.

Now, notwithstanding the presence of extreme violence, there were both direct and circumstantial evidence of the existence of a powerful reverse impulse, in Experiment

No. 13; as we are told, there was a back-suction that produced a pressure of 4 lb., while the conditions reported as existing in the gallery after the explosion, show that the force of the reverse impulse must have caused a pressure far in excess of that recorded.

Mr. Ashworth directs my attention, particularly, to the fact that, in one of these experiments, a ventilating current was present, while, in the other, there was no ventilating current; but in each case a violent explosion resulted. It must be remembered that the magnitude of a dust explosion, other conditions being the same, depends on the amount of dust ignited and the degree of heat developed at its starting point; and, again, the heat developed is largely modified by the method of ignition. There are several methods and combinations of methods by which the initial energy may be materially increased. The method used in Experiment No. 263 apparently proved very effective in this respect; but it is entirely too artificial and useful only in an experimental way. It can have no application in reference to explosions as they occur under ordinary mining conditions.

In Experiment No. 25, the initial energy of the blast was evidently much increased by the effects of the strong air current moving at the rate of more than 20 ft. per sec., and in opposition to the flame projected from the cannon. That this is a fair conclusion is shown by the following statement made by Taffanel: "Ignition was always greater when the shot was opposed to the direction of the air, or, relatively, toward the intake."

The existence of the reverse impulse during the progress of explosions has been shown, by experiments performed in the United States, England and Germany. It is obvious that such a reverse impulse must produce a strong inby movement of the air. Now, if, according to Taffanel, a comparatively feeble air current, traveling in opposition to the flame of a shot, has such a decided influence in increasing the ignition of the dust, it may be properly assumed that the vastly more powerful air blast, traveling in opposition to the explosion's flame, must be an important, if not *the controlling factor,* in propagating explosive combustion. In Experiment No. 21 of the Altofts series, two distinct explosions were observed at the downcast end of the gallery. Is there a more logical explanation of this phenomenon than to say that this was due to the action of such a "reverse impulse" or "counter-current," whereby fresh air and fuel were supplied to the hot and burning gases further inby, which produced again the explosive combustion of the dust?

Mr. Ashworth has a wide knowledge of mine explosions and the data concerning them, and I am, therefore, pleased to note his statement that he "does not recall a single case of mine explosion where the explosive combustion of suspended dust occurred under conditions restricting the power of the reverse impulse to induce a strong draft of dust-laden air moving in an opposite direction to that of the flame." If explosions under such restrictions have occurred, their extent and destructive force were probably very small, for recent experiments, in Germany, have brought out the fact that the effect of the explosion is much smaller in a gallery with the outlet closed, than in one with the outlet open. On the other hand, I am sure, Mr. Ashworth will have no difficulty in recalling many exceedingly disastrous explosions, both with respect to the number of lives lost and the destruction of property, that have occurred in mines where the presence of more than the usual number of openings to the surface and numerous underground passages connecting the mine workings afforded exceptionally good facilities for the propagation of explosive combustion, by giving ample opportunity for the creation of "reverse impulses" of great force.

JOHN VERNER,
Former State Mine Inspector.
Chariton, Iowa.

The Mine Foreman

Letter No. 4—I cannot let the article by Mine Foreman (W. Va.), COAL AGE, Apr. 18, p. 658, pass without protest. This letter seems to me to be misleading and its writer inconsistent. He asserts, in substance, that a competent mine foreman in West Virginia needs "protection from some source;" and adds "The state mining law gives him no protection but makes him responsible for the safe operation of the mine, requiring many things of him, in his official capacity, that he has no power to perform."

After reading and rereading the mining laws of this state, I cannot find anything in them that bears out such a statement. Section 15 of that law provides that "The operator or agent shall employ a competent and practical inside overseer to be called mine foreman." The law then enumerates his duties as mine foreman, and states, finally:

> The mine foreman shall notify the operator or agent of the mine of his inability to comply with any of the requirements of this section, and it shall then become the duty of any operator or agent to at once attend to the matter complained of by the mine foreman, etc.

Following this, the law prescribes a penalty for the failure of the operator or agent to comply with these requirements.

What further protection could a mine foreman wish than that provided by this section of the mining law? Under its provision, by a single word of his, he is able to shift the responsibility for the performance of any or all of his duties onto the operator or agent. In every case where the act requires the mine foreman to attend to certain duties, in his official capacity, it provides the means. I conclude that Mine Foreman is not acquainted with the mining law of his state or interprets it in a different way from what is intended.

In answer to his statement that the operation of the mine is, in almost every case, in the hands of the superintendent or manager, who regards him as a mere "timekeeper" and yet blames him for any accident or mishap that may occur about the mine, I would ask: What competent mine foreman of West Virginia would stand for such treatment as is described in this and succeeding paragraphs of the letter? I have been a mine foreman, myself, in this and other states, for the past eight years, and fully realize the responsibilities and trials of that position; they are legion. Far be it from me to discount the claims of the average mine foreman for consideration. He certainly is entitled to all the help he can receive from the state mining law, the superintendent or manager and the company. I must, however, reiterate my belief that no competent mine foreman needs to work or will continue to work long for a superintendent who treats him in the manner Mine Foreman would

have us believe they are treated in almost every case in West Virginia.

Every mine foreman soon finds that he is responsible for the safety of every man in the mine; and I fail to see how exception can be taken to this fact, which is the very purpose for which the position of foreman is created, according to the first paragraph of Sec. 15 of the Mining Law, which reads: . .

In order to better secure the proper ventilation of every coal mine and promote the health and safety of persons employed therein, the operator or agent shall employ a competent and practical inside overseer to be called mine foreman, etc.

In regard to the mine foreman being blamed for financial loss, arising from the carrying out of plans made in the office or by the superintendent, which cannot be put into practice without loss; to my knowledge, there are no mines in this state where the mine foreman has not a voice in reference to the manner of conducting the work and the best methods to be employed. In my opinion, the time is past when a superintendent or manager can go on making blunders and piling up costs against the better judgment of a competent foreman and make him shoulder the blame. In practically every case, the blame will revert to the responsible party.

I do not hesitate to say that, in West Virginia, there are some of the best regulated, most uptodate mines in the world, in charge of men who are the equal, in point of intelligent mine management, to any holding similar positions elsewhere. Granting this to be the fact, does Mine Foreman wish us to believe that the position he holds is an undesirable and humiliating one, in general, in the mines of West Virginia? Or, I may ask, in view of these facts, can we accept the assertion that the superintendents and managers who are capable of producing results such as are produced in West Virginia mines, would be capable of making the errors mentioned and laying the blame on the foreman? We must be fair and form our judgment upon the results attained.

My conclusion is that if any mine foreman, in an isolated place, finds himself surrounded by such conditions as are described in this letter as the common lot of every competent mine foreman in West Virginia, either he is a man not worthy of the name or position; or he is in the wrong place, in which case I would advise him to *"Beat it and beat it quick."* Judging from my own experience as mine foreman and superintendent, it would be hard to find two mine foremen in charge of mines in one district who are forced to work under conditions such as are here described.

SAMUEL M. MCMAHON, Supt.,
West Virginia-Pittsburgh Coal Co., Mine No. 4.
Wellsburg, W. Va.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Pressure Due to Box Regulator—The primary effect of the regulator is to increase the pressure on its intake side, by obstructing the flow of air in the airway or split that it controls. This increase of ventilating pressure is necessary to accomplish the desired increase of circulation in another airway, which remains open or unobstructed and which, for that reason, is called the **"free split."**

The increase of pressure is the pressure due to the regulator ;and is equal to the difference between the natural pressure of the free split and that of the split in which the regulator is placed, calculated for the required distribution of air. For example, in the illustration previously given, the natural pressure required to circulate 30,000 cu.ft. of air in Split C was 13.89 lb. per sq.ft., while that required to circulate 20,000 cu.ft. in Split A was only 2.17 lb. per sq.ft. The pressure due to the regulator in Split A is, therefore,

$$13.89 - 2.17 = 11.72 \text{ lb. per sq.ft.}$$

Velocity of Air Passing Regulator—The velocity of the air flowing through the regulator is determined by the difference of pressure on its two sides or the pressure due to the regulator. This velocity is calculated from the well known formula

$$v = \sqrt{2gh}$$

In the case of a regulator, the pressure head is equal to the pressure (p_r) due to the regulator, divided by the weight of 1 cu.ft. of air ($w = 0.0766$ lb.); and taking $2g = 2 \times 32.16 = 64.32$ ft. per sec., the theoretical velocity of the air due to this pressure is

$$v = \sqrt{\frac{64.32\ p_r}{0.0766}} = say\ 29\sqrt{p_r}$$

By this formula, the theoretical velocity corresponding to the pressure due to the regulator in Split A, referred to above, is

$$v = 29\sqrt{11.72} = 99.28 \text{ ft. per sec.}$$

Quantity Passing Regulator—Owing to the vena contracta, at the opening in a box regulator, the effective area of the opening is only 0.62 of the actual area A; and the quantity (Q), in cubic feet per minute, passing through the opening, is

$$Q = 60\ (0.62\ A\ v) = 37.2\ A\ v$$

Or, substituting the value of v, as given above,

$$Q = 37.2 \times 29\ A\sqrt{p_r} = 1078\ A\sqrt{p_r}$$

Or, since $p = 5.2$ w.g.

$$Q = 1078\ A\sqrt{5.2\ w.g.} = 2460\ A\sqrt{w.g.}$$

Area of Opening, Box Regulator—The area of the opening required to pass any given quantity of air, in splitting, is found by solving the last formulas given above, with respect to A, as follows:

$$A = \frac{Q}{2640\sqrt{w.g.}} = \frac{0.0004\ Q}{\sqrt{w.g.}}$$

The Coal Age Pocket Book

Example—Calculate the size of opening in each of the regulators in Splits A, B and D, in the illustration previously given where the required circulation was as follows:

	Required Circulation	Natural Pressure	
Split A,	20,000 cu.ft.;	2.17 lb. per sq.ft.	Regulator
Split B,	40,000 cu.ft.;	11.55 lb. per sq.ft.	Regulator
Split C,	30,000 cu.ft.;	13.89 lb. per sq.ft.	Free split
Split D,	10,000 cu.ft.;	2.98 lb. per sq.ft.	Regulator

Solution—The first step is to find the pressure due to the regulator and reduce that to water gage, in each case. The pressure due to the regulator is found by subtracting the natural pressure for the given split from that of the free split, which is always the one having the greatest natural pressure. Thus,

	Pressure Due to Regulator	Water Gage
Split A,	13.89 — 2.17 = 11.72 lb. per sq.ft.;	11.72 ÷ 5.2 = 2.25 in.
Split B,	13.89 — 11.55 = 2.34 lb. per sq.ft.;	2.34 ÷ 5.2 = 0.45 in.
Split D,	13.89 — 2.98 = 10.91 lb. per sq.ft.;	10.91 ÷ 5.2 = 2.10 in.

Substituting these values for the water gage due to regulator in the formula for finding the area of opening,

Split A, $A_a = \frac{0.0004\ Q}{\sqrt{w.g.}} = \frac{0.0004 \times 20{,}000}{\sqrt{2.25}} = 5.33$ sq.ft.

Split B, $A_b = \frac{0.0004 \times 40{,}000}{\sqrt{0.45}} = 23.85$ sq.ft.

Split D, $A_d = \frac{0.0004 \times 10{,}000}{\sqrt{2.10}} = 2.76$ sq.ft.

Use of the Door Regulator—In the use of the door regulator, the same general formulas apply, except that in estimating the quantity of air that will pass the regulator, for a given gage or pressure; or the area of opening necessary to pass a given quantity under such gage, no allowance should be made for vena contracta, which gives the following:

Quantity of air passing through an area of opening A, under a water gage w.g.,

$$Q = 3960\ A\sqrt{w.g.}$$

Area of opening required to pass a quantity of air Q, under a water gage w.g.,

$$A = \frac{0.00025\ Q}{\sqrt{w.g.}}$$

Example—What must be the width of opening of a regulator door where the height of the entry is 5 ft. in the clear, in order to pass 40,000 cu.ft. per min., if the natural pressure for the required circulation produces a water gage of 1.25 in. for this split and 1.75 in. for the free split?

Solution—The difference of pressure, in this case, is equivalent to a water gage of 1.75 — 1.25 = 0.50 in.; hence,

$$A = \frac{0.00025 \times 40{,}000}{\sqrt{0.50}} = 14.14 \text{ sq.ft.}$$

Width of opening, 14.14 ÷ 5 = 2.83 ft., or 2 ft. 10 in.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—If, when you were half through with the examination of a mine, you discovered that a door had been left open, how would you proceed?

Ans.—If the door stood open for any length of time, a dangerous condition of the atmosphere in that section of the mine may be expected. To close this door at once would be to throw a large quantity of gas out into the return airway. Before doing this, the precaution should be taken to safeguard the return air current and any other sections of the mine that may be affected by the closing of the door. The fireboss should make certain that no one will enter the return current after the door is closed. Having done this, he should proceed with caution.

It would be better to partially close the door, at first; and, following the intake current, proceed to examine the first chambers in this section of the mine. Every chamber and every void place or cavity in the roof should be carefully examined for gas, and where necessary, brattices should be erected to clear away any accumulation of gas in these places. Finally, close the door completely and continue the examination. The entire section must thus be carefully inspected to make sure that there are no accumulations of gas left behind. No open light should be taken into this section of the mine while the examination is being made, as a slight fall of roof might drive the gas back and cause disaster. If the condition of this section of the mine is found to be dangerous, no men should be permitted to enter the mine or work in other sections until the danger has been removed.

Ques.—Name six essential features of a safety lamp for testing purposes.

Ans.—A lamp to be used solely for the purpose of testing for gas should possess the following requirements:

1. The lamp should be simple in construction and consist of as few parts as possible.

2. The lamp should have a free upward circulation of air in the combustion chamber. This is necessary to avoid any tendency of the flame to smoke and to insure the same condition of the atmosphere within the combustion chamber as exists outside and surrounding the lamp.

3. To insure sufficient protection against strong air currents, a testing lamp should be provided with a suitable shield; and, to further protect the upper portion of the lamp chimney from the transmission of flame, all testing lamps should be provided with a double-gauze chimney, and all openings below the flame should likewise be protected with double gauze.

4. To insure uniform results in testing, it is preferable to burn a nonvolatile oil in the lamp. Sperm or cottonseed oil gives the best results. A volatile oil, as naphtha or alcohol, gives a slightly increasing flame cap as the lamp heats in gas, owing to the freer volatilization of the oil.

5. The gauze of the lamp should be of standard mesh (784 openings per sq.in.); and the diameter and height of the chimney should be such as to give a sufficient volume within the combustion chamber of the lamp to insure safety. The volume of the combustion chamber should neither be too large nor too small, to overcome the effect of possible slight explosions within the lamp, which occasionally occur when a bonneted lamp is exposed to sharp gas.

6. The lamp should be thoroughly clean and free from obstructions of any kind that would prevent the free circulation of the air and gases passing in and out of the lamp.

Ques.—A sinking bucket is 4 ft. 6 in. deep, 3 ft. 3 in. in diameter at the top and 2 ft. 9 in. at the bottom. What is the cubical contents of the bucket, and what weight of water will it hold?

Ans.—The diameter of the bucket being greater at the top than at the bottom, the cubical contents is calculated in the same manner as the frustum of a cone. Thus

$$vol. = \frac{0.7854\,h}{3}\,\frac{(D^3 - d^3)}{(D - d)}$$

$$= \frac{0.7854 \times 4.5}{3}\,\frac{(3.25^3 - 2.75^3)}{(3.25 - 2.75)} = 31.88\ cu.ft.$$

Taking the weight of 1 cu.ft. of water as 62.5 lb., the total weight of water this bucket will hold is $31.88 \times 62.5 = 1992.5$ lb.

Ques.—A drift is driven, with a dip of 3¾ in. to the yard, a distance of 455 yd., into a hill; the sidehill rises 5¾ in. to the yard. What would be the depth of a vertical shaft sunk to reach the end of the drift, and how far up the hill would the shaft be required to be located?

Ans.—The question does not state whether the inclination is given in inches per yard of *horizontal* measurement or per yard of *inclined* measurement. The calculation is simplest, assuming that all measurements are horizontal; but the results will be somewhat different if it is assumed that the inclination is per yard measured on the incline.

Assuming horizontal measurement, the dip being 3¾ in. and the rise 5¾ in. per yd. of horizontal distance, the increase of depth from the surface to the seam is $3\frac{3}{4} + 5\frac{3}{4} = 9\frac{1}{2}$ in. per yd. The total depth of the shaft, in this case, is $9\frac{1}{2} \times 455 \div 12 = 360.2$ ft. The horizontal distance from the mouth of the drift to the location of the shaft is then $455 \times 3 = 1365$ ft. The corresponding measurement up the hillside would be 1382.3 ft.

If, however, it is assumed that the inclination is given, *per yard measured on the incline*, it is necessary to calculate both the angle of inclination of the dip and the angle of inclination of the rise, the former being 5° 59′ and the latter 9° 11′. In this case, the depth of the shaft would be found to be 361.7 ft., and the distance measured up the side of the hill, 1375.2+ ft.

Coal and Coke News

Harrisburg, Penn.

In order that the Federal Government provide mine employees with more life saving implements the Mines and Mining Committee at a meeting held on May 4, decided to recommend a bill which provides for 10 additional mine rescue stations and 15 mine rescue cars, the distribution and location to be made be Dr. Holmes, the chief of the Federal Bureau of Mines.

A member of the committee and Dr. Holmes have held several informal conferences relative to this bill, and while no definite arrangement has been made as to the location of these cars and stations, yet it is the belief that at least one, possibly two more cars, will be located in both the anthracite and bituminous coal regions of this state.

It was also decided at the meeting of the Mines and Mining Committee to recommend a bill which will provide for the appointment of a commission, composed of five experts, to codify the mine laws of the country.

It is said the purpose of the commission shall be to gather together the best laws in all states, prepare the same and present them to Congress as a tentative code. Before reaching a final decision, however, the commission will hold public hearings in all the principal mining centers, invite and receive suggestions and opinions bearing upon or relating to existing mining laws, and it may consider the laws and experience of other countries with respect to the disposition and development of mines and mining. It is proposed to have the commission hold a session in Wilkes-Barre, in the anthracite region and at Pittsburgh in the bituminous region. It is stated that the laws must be codified and submitted one year from the date of the passage of the bill. The sum of $25,000 is to be appropriated for expenses.

Answers to Government's Suit Filed

The Lehigh Valley Coal Co., the New York & Middle Coal Field Railroad & Coal Co. and Coxe Bros., & Co., Inc., have filed their answers as defendants in the government's equity suit under the Sherman law for dissolution of an alleged combination acting in restraint of trade.

The Lehigh Valley Coal Sales Co.'s answer has already been filed. The answers deny the charges of restraint of trade made in the government's petition.

The Lehigh Valley Coal Co. in its answer denies that it is engaged in interstate commerce, claiming that it sells its entire product to collieries. Of its holdings in coal lands in Pennsylvania 24,746 acres out of 54,299 acres are located upon the Lehigh Valley R.R. tracks, the coal company of that name admits, but it denies that these properties were acquired under the influence or guidance of the railroad. Its holdings are 19 per cent. of all coal lands upon the railroad's lines, it says, and its total product about one-fifth in amount of the total coal shipments on that railroad. Five of its directors are also directors of Coxe Brothers & Co., Inc., the company further admits.

Contracts made with many other coal operators along the Lehigh Valley R.R.'s lines are admitted to exist, but the main inducement in making them, it is asserted, was to obtain a higher standard of preparation of coal. Direct or indirect fixing of percentage paid under these contracts under published rates of transportation, prejudicial to independent operators shipping upon their own account is denied in the answer.

The company has never paid a dividend, and some years it has lost money the answer says. Prior to 1902 it borrowed from the railroad and on Mar. 1, 1912, it paid 4 per cent. interest on an indebtedness aggregating $10,350,000. But the subsequent retirement of certificates of indebtedness by payments in cash and the railroad's debentures were not transactions to cover rebating, nor was the interest paid unusually low, it is claimed. Denial is also made that money was received through the resale to it of the railroads stock in companies owning coal properties.

Flushing Provides Surface Support

Expressing satisfaction that the plan as put into effect nearly three years ago is the best that can possibly be devised, the Delaware, Lackawanna & Western R.R. Co. does not intend indorsing the plan of the People's Coal Co. made to the Scranton Surface Protective Association for the protection of the surface over its workings.

Frank P. Christian, president of the Peoples Coal Co., has made an offer to safeguard the surface in the business section of West Scranton, if the association withdraws several suits against his company. The Christian offer had the endorsement of many prominent engineers, and an amicable court action is to be started so that the offer may be embodied in a decree.

It is estimated by the Lackawanna people that the plans put into effect by the company about three years ago for the protection of the surface and the repairing of property damaged by mine disturbances have resulted in an expenditure of $1,325,000 by the company. Of this sum a total of $1,200,000 went for flushing the workings, and the remaining $125,000 was expended in the repair of properties damaged by mine disturbances.

It is thought that the worst damage resulting from disturbances in the workings of the Lackawanna company has been done, and that Scranton will not have any repetition of the mine cave damage done over the company's workings in South Scranton. The caves in South Scranton, North Scranton and the twenty-second precinct, were in areas marked in the start by outcroppings of the surface veins, and as the mine workings extended further along the vein a larger stratum of rock that served as a solid protection to the surface was encountered.

The Lackawanna company's plan provides for the flushing of the under-ground workings, the leaving of pillars in places where there are valuable properties on the surface, the repair of which might over-balance the gain made in the mining of the pillars and the repairing of properties damaged by settlings.

It is estimated by the Lackawanna people that 125,000 tons of material are flushed into the workings every month at a cost of $3.24 a ton, or $40,000 a month. This would total $480,000 for a year. Since an agitation about two and a half years ago in South Scranton for the solution of the mine cave problem the Lackawanna company has expended $125,000 in this work.

The flushing process provides for the utilization of rock, slate and other material remaining on the ground or coming from the coal when it is being prepared into market size. The material is broken into fine pieces and mixed with the ashes coming from the boiler plants at the collieries, being flushed by gravity into the veins where the elevation is 100 feet or more below the surface. Also there is much handpacking of the chambers done, and in many instances pillars, sufficient to support the surface are left in place. This latter plan is followed in congested parts of the city where a cave might result in a property damage that would be so great as to offset the profits to be made in the mining of the pillars.

PENNSYLVANIA

Anthracite

Drifton—The Lehigh Valley Coal Co. has resumed operations on its property below Coxe's Addition, formerly the old Tigers' Park. No work has been done in the stripping for over two months, and a number of new hands have been taken on.

Avoca—On May 8, the earth gave way south of the Laurel Line R.R. tracks, making a depression resembling a submerged ampitheater. The water main burst and the rush of the stream into the mine workings could be heard for some distance. Although the ground was falling away all day it did not reach the houses near by nor did it work any closer to the Laurel Line station. The laborers called were handicapped on account of the steady working of the cave and could make little headway.

Summit Hill—Men working in chute No. 22 in the slope of the No. 4 colliery of the Lehigh Coal & Navigation Co., had driven a hole and discharged a blast on May 4, when an explosion of gas followed. The hole had blown into a pocket of gas, which originated by the close proximity of the Summit Hill mine fire, which has been burning for years. Eight men were overcome by the fumes, but with the aid of pulmotors they were brought around. The mine caught fire and a force of fire fighters were employed in an endeavor to subdue the flames.

Hazleton—The Hazle colliery of the Lehigh Valley Coal Co., which was closed down when the men struck to force a dozen delinquent members of the United Mine Workers into the union, has resumed operations again. As soon as the strike occurred the company ordered a shutdown, which lasted 10 days.

Tamaqua—More than 4000 members of District No. 7, United Mine Workers of America, attended a mass meeting here on May 3, and $1000 was donated to the cause of the Western miners. It is expected sub district No. 1 of Tanaqua and the Panther Creek Valley will contribute $5000 or more in a short time.

Norristown—The Lehigh Coal & Navigation Co., the Lytle Coal Co., and the Philadelphia & Reading Coal & Iron Co. were each sued for $7500 damages on May 7 by Annie R. Anderson, a farm owner in lower Providence township, for alleged injuries to her land, pasturage, growing crops and water rights. Mrs. Anderson in her statement asserts that the defendants, in operating their mines, discharge into the Schuylkill River large quantities of coal dirt, mining refuse, culm and muck, and when the river is high, this is carried onto her farm, doing damage to the soil and crops.

Shenandoah—A breaker, owned and operated by the William Nicewinter Coal Co. collapsed on May 4, because of a mine cave. The men and boys employed in the building had just enough warning to allow them to jump through the numerous windows or crawl through the topway, or head plane. Many were bruised, but none seriously injured.

McAdoo—The Grand Jury of Schuylkill County on May 5 returned an indictment against the Lehigh & Wilkes-Barre Coal Co. on a charge of violating the law passed by the recent legislature, known as the "Lenker Docking Law," which requires the keeping of a record of the number of cars of coal mined at the company's chutes. This is the first time on record where a corporation has been criminally indicted on such a charge. The alleged offense occurred at McAdoo, and the officials of the colliery who are the only officers of the Lehigh & Wilkes-Barre Coal Co., in Schuylkill County, will be the defendants. Alexander Bonus, a miner, is the prosecutor.

Springfield—Fires on mountains surrounding this place are approaching numerous collieries of the Philadelphia & Reading and Mineral R.R. & Mining Co. Large numbers of workmen on May 4 started fighting the flames, which have destroyed a large amount of valuable timber.

Bituminous

Smithfield—The tipple at one of the mines of the Republic Iron & Steel Co. collapsed several days ago. No cause is given by the management for the accident. The damage was slight and will soon be repaired. Three men were hurt by being caught by falling timbers.

Fairchance—Options are being secured on the Freeport vein of coal all through this section. It is said that all the territory from Fairchance to Point Marion will be canvassed, and that it is expected to get from 20,000 to 25,000 acres. A. M. Frederick, Sr., of Fairchance, is securing the options. It is understood that papers have already been signed for about 16,000 acres. The price named in the options is $50 per acre. The Freeport vein is from 4 to 6 ft. thick. The coal is high in sulphur and has to be crushed and washed before it will make good coke.

Uniontown—Sheriff Martin A. Kiefer, of Fayette County, amicably settled the strike at the Herbert plant of the Connellsville Central Coke Co. recently. He explained that the trouble was due to a misunderstanding and the men agreed to return to work. The plant was practically shut down with the exception of the boiler room, which was kept in operation by the clerks of the office who volunteered to act as firemen. In this way, the pumps were kept running, and the mine kept free from water.

Punxsutawney—After over a month's idleness, the Clearfield Bituminous Coal Corporations mines at Rossiter, started work May 7. Work was also resumed at the Yatesboro, Lucerne and Jacksonville mines of the Rochester & Pittsburgh Coal & Iron Co.

Braddock—A resumption in coal mining operations in this district upon a large scale is contemplated by all the leading coal mining companies. Inquiries for coal from consumers who had stocked up in anticipation of a strike after Apr. 1 have begun. It is also expected that lake coal will be moving by the middle of the month, which will still further increase activity.

Clearfield—By a large majority the 30,000 miners in this field have voted to accept the 1912 scale of wages, which the operators have agreed to, and this scale will under the vote continue in force until Apr. 1, 1916. There will be no strike in this field, therefore, on the question of wages, although for a time this was regarded as inevitable.

WEST VIRGINIA

Charleston—According to estimates made by the Public Service Commission, based on the reports of the Eccles disaster now available, the state will pay to dependents of miners killed there during the coming year about $2200 per month from the workmen's compensation fund. Each of the 85 widows will receive $20 a month, with $5 additional for each child under 15 years old. Besides this the state will pay the funeral expenses of the men killed, making a substantial lump sum to be disbursed from the fund at once. It is stated that the fund is ample to meet this rather severe test, however, and that there will be and has been no delay in meeting the demands made upon it.

Members of the local unions of the United Mine Workers in the Kanawha district must either return to work pending negotiations for another wage agreement between the coal operators and miners or surrender their charters as members of the national organization. Under these conditions many of the men are returning to work.

Bluefield—The Federal Court convened on May 6 found Sam Tabor and William Thomas not guilty of peonage charges and similar charges preferred against W. J. Pritchard and the Thomas Coal & Coke Co. were dismissed. The government agents who worked the case up claimed to hold absolute proof of the defendants detaining four men who were brought to the W. H. Thomas Coal & Coke Co. works on transportation and were there detained because of their refusal to work out the amount of this indebtedness. The decision is held to signify in a general sense that men cannot avail themselves of such transportation facilities to get over the road and then beat the company bringing them in.

Eckman—Thieves recently entered the offices of the Pulaski Coal & Iron Co., unlocked the safe, and escaped with over $300. From what could be learned of the robbery, it appears that this money had been in the post office, and there being no safe in this building, it was removed to the offices of the Puaski Coal & Iron Co., and placed in the safe. No arrests have yet been made.

Wheeling—The Whitaker-Glessner mines resumed work May 7, the management having signed the run of mine scale in which the pick mining is 71.37 cents and the machine scale 49.64 cents.

Parkersburg—The Big Creek Development Co., has filed against the local internal revenue agent a suit for $20,000 damages, in order to test the 1 per cent Federal tax on corporate incomes.

ALABAMA

Indio—The suit between the holders of $69,000 worth of the De Soto Coal Mining and Development Co.'s bonds and R. A. Porter, trustee, is being heard before the referee in bankruptcy. The original bond issue was for $75,000, of which $6000 has been redeemed.

KENTUCKY

Louisville—Last week saw representatives of the mine owners of the Western Kentucky field and representatives of their employees meeting at Louisville in another futile effort to reach an agreement as to their differences over the wage question. After several days of negotiations the conference was adjourned to give time for each side to confer on suggested compromises. Some 32 mining companies and 6000 employees are directly concerned in the settlement of the dispute, with probably as many more mining companies not affiliated with the operator's organization but which nevertheless are practically bound by whatever agreement is reached.

OHIO

Martins Ferry—The first reports of anything bordering on violence in connection with the strike of Ohio miners were received in Bridgeport, when it was reported to the police by railroad men that bricks and stones had been hurled through the cab windows of locomotives hauling West Virginia coal to the Lakes while the train was passing through Crescent. No railroad men were hurt, but it is expected steps will be taken to protect the men and the trains in the future.

Expectations are entertained in this sub-district that settlements will be made in the Hocking and one or two other districts in Ohio within a few weeks. This is expected to improve the chances for a local settlement. Once the mines in other fields are working, it is believed that it may have some effect on the operators in this locality, although it is realized that West Virginia coal is being quoted in Cleveland at a price lower than eastern Ohio coal can be placed on the cars without considering the freight.

Coshocton—Work has been started by Charles E. Wells and others to reopen the old Black Diamond mine, located at Hardscrabble, near Coshocton. The mine was in operation 40 years ago but was later abandoned. A portion of the entry had caved in.

INDIANA

Indianapolis—The International Executive Board of the United Mine Workers of America adjourned May 8 after being in session for several days discussing the condition of miners, especially those in Colorado, Ohio, and West Virginia. The Board issued a statement advising against a general strike, but affirming in strong terms its support for the striking miners of Colorado.

Terre Haute—Approval of the report of the sub-scale committee by the joint convention of miners and operators on May 7 averted a threatened strike in Indiana, and provided for a contract for two years. Concessions were made by both miners and operators.

Petersburg—Fire destroyed the tipple at the Winslow coal mines near here recently. It is supposed that the origin was accidental. These mines have not been operated for some time and the property was recently sold to the Ingle Coal Co., which owns and operates the mines at Ayreshire.

Sullivan—The Stockton school township, of Greene County, has brought suit against the Vandalia Coal Co. for $9000 damages for trespass and damage to real estate alleging that the company mined the coal from under a school building, and damaged the building and property.

Brazil—An accident in the Lost Creek Mine of the Vandalia Coal Co. near here, recently put 300 miners out of work for a few days. The cage was hoisted before a car of coal had been securely placed upon it, and part of the timbers of the shaft were torn out and the cage practically demolished.

ILLINOIS

Canton—The Simmons coal mine, north of Canton, opened May 4, with a full force of men.

Springfield—Judgment against the Auburn & Alton Coal Co. for $234.87, in favor of the Commercial Electric & Supply Co. was recently entered by Judge Creighton in the Circuit Court. The defendant failed to answer a bill asking for a payment on a running account.

Farmington—The Nickle Plate coal mine which was to start work recently, was examined the day before that set for the beginning of operation and found to be full of black damp. When the men and mules left the mine on Mar 31, the fans were stopped, and the gas began to accumulate. It is believed that a fall of roof has obstructed the circulation of the air.

Edwardsville—The City Coal Co., of Edwardsville, has turned its lease on Mine No. 3 over to the owners, the Edwardsville Coal Co., which is considering converting the property into a large coal yard. The mine has been operated for 35 years.

ARKANSAS

Fort Smith—A representative of an English syndicate is reported to have established headquarters at Fort Smith, and secured options on thousands of acres of coal lands in Arkansas and eastern Oklahoma. The plan of the syndicate, said to be capitalized at $10,000,000, is to develop the land, marketing its coal largely at the Panama canal.

Bates—The Packard Coal & Coke Co. has closed down its mine, as the result of a disagreement with the miners.

Russellville—The Southern Anthracite Coal Co.'s mine at Russellville resumed operation May 6, after having been closed for a few days, following an inspection by Thomas Shaw, state mine inspector. Mr. Shaw objects to the system of driving entries in the mine, and by agreement it was decided to allow the Circuit Court to settle this question. This mine employs about 400 men.

KANSAS

Pittsburg—Two score operators and representatives of railroads held their semi-annual meeting at Pittsburg, Kan., recently to discuss the handling of cars during the coming summer and fall. The operators and railroad men meet twice a year for the purpose of planning expeditious handling of coal.

OKLAHOMA

Bartlesville—The decline in the oil market has renewed interest in the development of coal and other minerals found in Washington County, and it is probable that by fall, work will be well under way and that shipments will be made. A rich deposit of coal has been discovered in the northern part of the county, and a large number of leases on land have been executed. It is believed that actual development will start in a short time.

PERSONALS

Martin Clark, of McAllister, Okla., has announced himself as a candidate for nomination for the office of chief mine inspector subject to the approval of the August Democratic primary.

E. E. Purser recently appointed general superintendent of the mines of the Woodward Co., it is reported will have complete supervision of all the mines in both ore and coal divisions.

W. H. Soper, of Winchester, Ky., has been made general manager of the Wolf Valley Coal Co. This is the property recently sold by Hon & Tomlinson, of Winchester, to the Wolf Valley Company.

John J. Shannon has accepted an important position with the Woodward Iron Co., his title being assistant to the vice-president. He will have charge of the furnace operation at Woodward and Vanderbilt plants.

Hywel Davies, business manager of the Kentucky State University, formerly a coal operator in Kentucky, has left for Colorado where, as one of the mediators in the mining dispute in that state, he will seek to discover a solution of the industrial trouble.

R. H. Gillespie, of Vinita, Okla., and Andrew Voyles, of Woodley, Okla., have secured leases on 10,000 acres of coal lands near Bluejacket, Okla., following the discovery of promising coal deposits. A five-foot coal bed was found near Bluejacket at a depth of 341 feet.

G. W. Hill, general manager of the Virginia-Kentucky Fuel Co., of Cincinnati, who has been suffering for several weeks with an illness resulting from overwork, has gone to French Lick, Ind., to take a course of treatment and to rest up, in the hope of regaining his health shortly.

Ivor Thomas, a prominent hotel man of Boswell, Penn., has purchased a 200-acre tract of coal between Boswell and Ralphton, and will open a mine within a short time, other openings to be made as business may warrant. It is the intention to ship 1000 tons of coal daily to the eastern market.

A. J. Baggs, sales representative and W. H. Bines, mechanical engineer, have severed their connections with the Watt Mining Car Wheel Co., of Barnesville, Ohio, and will engage in the same line of business at Huntington, W. Va. Mr. Baggs has completed 20 years, and Mr. Bines 14 years of service with the Watt Co.

W. H. Cunningham, secretary of the Kentucky Coal Mine Owners Association, has established in his office a sort of clearing house for information on the new Kentucky Workmen's Compensation law. Mr. Cunningham has announced that he will be glad to supply not only mine operators but all other employers of labor with any information on the subject that is available.

John A. Bell has been elected the president and a director of the Carnegie Coal Co., of Pittsburgh, succeeding R. P. Burgan. Mr. Bell is best known as a successful banker in Pittsburgh and western Pennsylvania, but he has had much to do with the development of the coal industry in the Pittsburgh district. R. P. Burgan who he succeeds is retiring from business after many years of activity. He will make a trip abroad this summer, spending some time at Cornwall, England, where he was born.

Frank D. Rash, vice-president and general manager of the St. Bernard Mining Co. in the Western Kentucky field, with headquarters at Earlington, has been elected first vice-president of the Kentucky Manufacturers & Shippers Association. In that capacity he is taking a prominent part in the efforts of that organization to find a solution of the present fire insurance tangle in Kentucky, foreign company's having withdrawn after the passage by the last Legislature of a law incresing the powers of the State Rating Board.

OBITUARY

John W. Tully, a mine foreman in the Sugar Camp mine, Caperton, W. Va., and one of the most popular miners in the New River field, was electrocuted when he came in contact with an overhead wire while standing on a piece of sheet iron engaged in repairing a mine motor. He was 38 years old.

William H. Cochran, 56 years of age, a well known coke and coal operator, died recently at Dawson, Penn., following several weeks' illness from carbuncle and erysipelas. His death occurred almost 71 years to a day after his father, James Cochran, disposed of the first coke ever sold for money. Mr. Cochran was a part owner in the Washington Coal & Coke Co., and also had coal holdings in West Virginia, being a promotor of the Cosmopolitan Coal Co., of Braxton. He was well and favorably known throughout Fayette County, and has spent practically all his life in and near Dawson. He is survived by his wife, four children, and three brothers.

CONSTRUCTION NEWS

Pineville, Ky.—The Pioneer Coal Co. will soon begin the erection of a large commissary in its camp at Kettle Island. The company will also put up a number of new miners' homes.

Flat Rock, Ky.—The Kentucky Coal & Iron Co., which recently purchased the Coger mines near here, is preparing to install modern machinery, including electric cutters and motors. The power house is now in course of construction.

Penny, Ky.—The Penny Coal Co. is proceeding with the construction of a mining camp and plant to have a monthly capacity of from 35,000 to 40,000 tons. John G. Smith is manager.

Webb, Ohio—Improvements costing in the neighborhood of a quarter of a million dollars have been completed at the Webb Mine, at Webb, formerly called Lashley Station, in the southern part of the county. The mine is now ready to start operations as soon as the mines of the state resume work.

Columbus, Ohio—It is learned from a reliable source that the Hocking Valley Ry. Co. is planning to double-track its line from Columbus to Toledo as soon as the financing can be done. The improvement is to be made, it is said, to take care of the added traffic when the Chesapeake & Ohio connects with the Hocking Valley at Portsmouth.

New Orleans, La.—If a project now being considered by New Orleans capitalists materializes immense coal yards will be established along the New Basin Canal, and the barges of the Alabama & New Orleans Transportation Co. will be enabled to discharge cargoes of coal direct from the Warrior River fields of Alabama in the heart of New Orleans.

Grafton, W. Va.—It is understood that the Austen Coal & Coke Co. will shortly rebuild its tipple and plant, which was burned down a few weeks ago with an estimated loss of $25,000. It is said that preliminary work has already been started and that active preparations to rebuild the entire plant are now under way. It is believed that the new plant will be somewhat larger than the old one.

Chattanooga, Tenn.—The Durham Coal & Iron Co. expect soon to begin the construction of the proposed coke-oven plant, which was recently decided upon. The company's engineers are preparing a plan and specifications, and a site will soon be chosen. The company has decided to undertake this construction work with its own engineers in charge. Approximately one million dollars will be invested, the ovens being built in blocks of 30 and 60, with a view to future additions.

Columbus, Ohio—The announcement is made that within a few weeks ground will be broken for a 40,000-hp. power plant to be erected at Floodwood, midway between Nelsonville and Athens, Ohio for the purpose of supplying coal mines in the Hocking Valley with electrical current. The project is backed by English capitalists and the construction will be under the charge of F. C. Elliott, of Chicago. Herman Hamper, formerly of Columbus, will be engineer in charge of construction.

Winchester, Ky.—In the way of railroad building into coal lands, work is progressing rapidly in the construction of the Winchester-Irvine extension of the Louisville & Nashville to Dry Fork, at which point the steel for a bridge is being delivered. It is expected that the bridge will be in condition for traffic in a few weeks, when construction beyond that point will be begun and track laying pushed through to upper Howard's Creek, where another bridge will be necessary. Gangs operating from the other end will meet the Winchester crew at Red River, where a large bridge is to be erected. Much coal land will be opened up by this road, and more than six miles of new sidetracks have been built in the southeastern section of this city to handle the increased volume of traffic that will result from the new line.

NEW INCORPORATIONS

Ashland, Ky.—The Buffalo Creek Coal Co., with a capital of $50,000, has been incorporated by J. W. M. Stewart, K. M. Fitzgerald and L. S. Wilson.

Harlan, Ky.—The Kentucky-Harlan Fuel Co., with an authorized capital stock of $80,000, has filed articles of incorporation. The incorporators, each of whom holds three shares of stock, are Homer C. McLellan, F. D. Keithly, and Charles Oestrich.

Harrisburg, Penn.—Charters were issued on May 4, for the Grazier Coal & Coke Co., and the Grazier Coal Mining Co. These concerns are capitalized at $200,000. It is expected that in the near future an output of 1000 tons per day will be secured from the mines of these companies at Foustwell, where the operations of the Somerset and Cambria Coal Co. have been purchased by the newly chartered organizations, which are also purchasing additional lands in that section.

INDUSTRIAL NEWS

Columbus, Ohio—A company is being organized in Columbus, Ohio, to make concrete posts suitable for mine supports. The concrete comes in blocks with concave surfaces on both ends.

Steubenville, Ohio—Because of the breaking of a shaft, on the towboat "Cruiser" on the Ohio River recently, four coal barges were crushed and a large amount of coal was thrown into the river.

Springfield, Ill.—The Chicago & Alton R.R. has put on a night shift to handle the apparatus used in picking up stored coal in North Springfield. All of this coal will be removed from storage by June 1.

Wellston, Ohio—The W. H. Warner Coal Co. is planning the purchase of a new mine on the Hocking Valley R.R. and is also arranging to sell the entire output of the Wellston Coal Co.'s mine at Wellston.

Philadelphia, Penn.—The April anthracite shipments totaled 6,072,164 tons against 5,966,189 tons in April of 1913. For the four months ended Apr. 30 shipments were 20,534,050 against 22,886,065 for the same period of the previous year.

Chicago, Ill.—The freight tariff proposed by the Chicago, Burlington & Quincy and the Rock Island railroads advancing rates on coke from Chicago and other Illinois points to St. Paul was suspended recently by the Interstate Commerce Commission until Aug. 30.

Williston, N. D.—Uncle Sam not only owns a railroad in Idaho, but also owns and operates a coal mine in North Dakota, near Williston. The coal is mined to supply fuel for a power plant, which furnishes electricity for a pumping station at a nearby irrigation plant.

Pittsburgh, Penn.—Five towboats of the Monongahela River Consolidated Coal & Coke Co.'s fleet left the Pittsburgh harbor May 7, with a combined tow of 65 towboats, 25 barges, and one freight barge, aggregating 1,720,000 bu. of Pittsburgh coal. This is said to be the largest shipment for one day in recent years.

Estevan, Sask.—The experiments by the Government of Saskatchewan in the carbonizing of the soft coals which are found in the province are being conducted in this village. The result of the tests so far made has proved highly satisfactory, and it is expected that the carbonized coal will shortly be placed on the market at about $5 per ton. It is claimed that by the carbonizing process, the heat value of the fuel is brought up to the standard of Pennsylvania anthracite. Briquettes will also be manufactured under the new process.

Chicago, Ill.—The Gun-crete Co. has opened its new offices in the McCormick Building, Chicago. This firm specializes in cement-gun work for engineering, industrial and mining structures, and has at its disposal a large amount of the most modern cement-gun euipment, and an efficient working organization. Carl Weber, president of this firm, is one of the best known concrete engineers in America, being the inventor of the reinforced-concrete chimney, of which thousands have been built in this and foreign countries. He has been connected with cement-gun operation for some time, and is considered to be one of the leading experts in this line of work.

Coal Trade Reviews

General Review

Steam grades of anthracite beginning to crowd the storage bins, but domestics still continue in fair demand. Bituminous coal absorbed very slowly, curtailment on contracts being the rule and consumers very critical as to quality. Heavy concessions on prompt business.

The domestic grades of hard coal are about normal for this period of the year, but the steam sizes are beginning to crowd the storage bins, and individuals are offering substantial discounts to keep these grades moving. Shipments are going forward to the distributing center somewhat more freely, and the agencies are beginning to quietly look around for orders. The demand generally is centering on stove coal which size is bringing a premium all along the line. With large stocks of anthracite in the Northwest the Lake opening is the slowest in the history of the trade. From the generally adverse conditions it is probable that curtailed mining will have to be practised before the summer is over.

Bituminous stocks are large in every direction, while contract consumers are holding producers down to minimum deliveries, and each week sees the business becoming lighter. The month's suspension in mining failed to create the anticipated gap in the supply, and there is no impetus of any kind in the trade, while consumers are becoming very critical regarding quality. Buyers refuse to be interested under any consideration, while shipments are absorbed very slowly, and then only at low figures. In fact the trade seems to be settling down to the lowest point for a number of years.

Surplus stocks in the Pittsburgh district have not been liquidated, and the demand is considerably off; railroad consumption is light, and manufacturing much below normal. Prices are firm on contracts, but heavy cuts are offered on spot business, although such business is so light that it is of little consequence; lake shipments amount to practically nothing, and production is at 40 per cent. capacity. There is some West Virginia coal moving into Ohio, but it is in poor demand, as consumers still seem to be heavily stocked. The return of the miners in the Kanawha district eliminated the possibility of obtaining relief through a general suspension in that district. Negotiations for another conference on the Ohio wage scale are now being arranged for. The quotations at Hampton Roads are being maintained on export business, but there are persistent rumors of concessions being made on coastwise shipments to New England. The past week witnessed a heavy dumping, and the accumulation at some piers is below normal.

The renewal of the wage scale on the same basis as the old one in Indiana is the feature of the Middle-western situation; this has relieved whatever apprehension there was regarding a shortage, and both production and buying have eased off still further. There is practically no demand for domestic coal, dealers showing no disposition to undertake the customary summer stocking, because of the adverse financial situation. A few contracts are being closed up, and it is expected that some of the large railroads may be in the market shortly.

EASTERN MARKET

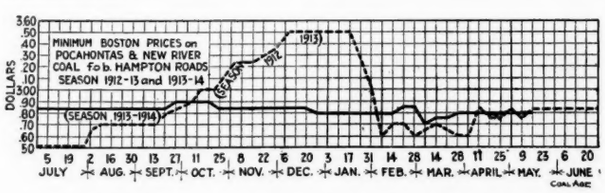
BOSTON

The lightest week of the season thus far. Consumers who failed to contract early, buy now from hand to mouth. Market cargoes absorbed very slowly. Marine freights unfavorable to Pennsylvania coals. Georges Creek mines under short time. Anthracite shippers seeking orders.

Bituminous—No improvement can be reported in the generally dull situation. The week past has been perhaps the very lightest of the season so far; almost no new business has been taken on and large consumers are holding down their shippers to minimum deliveries. Practically all the buyers now who did not make purchases early are buying only from hand to mouth, confident they will be able to make more advantageous arrangements in mid-summer.

There is no change in prices on Pocahontas and New River, although what few sales are made are on a delivered rather than an f.o.b. basis. Cargoes destined for inland distribution are absorbed slowly and then only at low figures. Stocks are large in every direction.

Marine freights from Philadelphia prevail rather higher than from Hampton Roads and this condition makes hard going for the Pennsylvania grades that sell only 5@10c. less f.o.b. than Pocahontas and New River. Consumers are extremely critical in such a season and the Pennsylvania coals are likely to lose some of the tonnage they gained last year and the year before. All-rail, the demand is only a shade better. Georges Creek shippers are succeeding in placing their current output which is somewhat curtailed. The New River shippers have made some inroads on Georges Creek tonnage this year and the aggregate is likely to be considerable.


MINIMUM BOSTON PRICES on POCAHONTAS & NEW RIVER COAL f.o.b. HAMPTON ROADS SEASON 1912-13 and 1913-14
(SEASON 1913-1914)
(SEASON 1912-1913)
DOLLARS
JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APRIL MAY JUNE

Anthracite—Shipments have come forward more freely since May 1 and already the companies are mildly soliciting new orders. Stove size is short at all the loading ports and consignees are now being restricted to a third and in some cases a fourth of a cargo in conjunction with other sizes. The weather is warm and the only retail business is with trade that is willing to fill up for next season.

Bituminous prices at wholesale are about as follows:

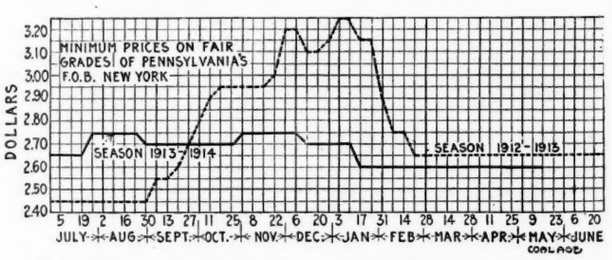
	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*.....	$0.95@1.50	$1.20@1.60	$1.67@1.77	
Philadelphia*.....	2.20@2.75	2.45@2.85	2.92@3.02	
New York*.....	2.50@3.05	2.75@3.15	3.22@3.32	
Baltimore*.....	.....	.....	2.85@2.95	
Hampton Roads*.	.....	.....	.....	$2.80@2.85
Boston†.....	.....	.....	.....	3.55@3.78
Providence†.....	.....	.....	.....	3.50@3.73

* F.o.b. †On cars.

NEW YORK

Heavy curtailment on bituminous contracts. Trade settling down into a dull summer. Anthracite steam grades weak, but domestics approximately natural for this season. Curtailment in mining in sight.

Bituminous—The curtailment in the movement of soft coal has become so general that there scarcely seems to be any business negotiated at all. There is no demand in any direction, and market observers are slowly becoming convinced that the trade is settling down into one of the worst summer seasons for many years. One of the most serious features of the situation is the way in which consumers are curtailing requisitions on contracts. Although little business is expected in the spot trade when conditions are dull, it is seldom the contract requirements are so heavily cut as at present. The general impression is that the situation will continue as at present throughout the summer, or until the crops begin to move, and the railroads are again forced to buy.


MINIMUM PRICES ON FAIR GRADES OF PENNSYLVANIAS F.O.B. NEW YORK
SEASON 1913-1914
SEASON 1912-1913
DOLLARS
JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE

Prices, as a rule, are holding remarkably well, considering prevailing conditions. Odd tonnages of demurrage coal are, of course, being forced on the market at heavy sacrifices, one sale being reported down to $1.80 at tidewater. But aside from such abnormal business, the circular quotations are still generally held as follows: West Virginia steam, $2.50@2.60;

fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—It is reported at some points that hard coal is also feeling the effects of the general retrenchment in industrial circles, particularly in the steam grades, but it is generally felt that the market is approximately normal for this period of the year. The demand is still centering on stove coal, which is about the only grade commanding a general premium all along the line, individuals readily obtaining 10c. per ton above the regular circular here. Egg coal is in steady demand, although occasionally selling off to avoid demurrage. In Manhattan, chestnut is absolutely flat, and impossible to move, but Brooklyn dealers are taking some in order to get an allotment of stove coal with it; in an ordinary straight transaction involving chestnut alone, it is difficult to move at 20c. off the circular. With a good demand in the West, it is difficult to understand why so much of that grade is being sent into this market.

Pea coal is selling down to between 20 and 30c. off the circular, where individuals are forced into the market to avoid demurrage. The depressed situation ruling on pea and chestnut at tidewater is due to the sharp falling off in the line trade. Low-grade No. 1 buckwheat has sold as low as 30c. off the circular; high grades are still in fair demand, but are selling off 15c. The high-grade barleys are down to 10c. off the circular, with the lower grades as much as 40c. off.

Indications generally point to a poor summer business in anthracite. It seems probable that it may even be necessary to practice some curtailment in mining, and even then the outlook is not any too cheerful. Quotations are now ruling at the following rather low level:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.70	$4.70	$4.65	$4.65
Egg	4.95	4.90@4.95	4.90	4.80@4.90
Stove	4.95	4.95@5.05	4.90	4.90@5.00
Chestnut	5.20	5.00@5.20	5.15	4.95@5.15
Pea	3.55	3.30@3.55	3.45@3.50	3.20@3.45
Buckwheat	2.80	2.75@2.80	2.50@2.75	2.15@2.75
Rice	2.30	2.30@2.40	2.00@2.25	1.75@2.25
Barley	1.80	1.70@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

Anthracite outlook favorable for May. Mining still at full capacity. Steam sizes flat and considerable going into stock. Bituminous market dull, with prospects poor. Prices and demand at low ebb.

Anthracite—With the first half of May gone, the prospects look favorable for good business until its close, on the steam sizes, which are already crowding the storage bins of the large operating companies. This is no unusual feature, as spring and summer always finds these sizes in excess, and while the individuals create a market by making concessions, the large companies with storage facilities stack their superfluous product in order to take care of the heavy demand on contracts during the fall and winter.

Broken, egg, stove and chestnut are moving off as rapidly as produced, but there seems to be a feeling in the trade that the close of May will see a period of inactivity which is likely to extend throughout the summer months. As a matter of fact, the Northwestern market is supposed to absorb the surplus during the summer months, but the open weather that prevailed during most of the winter, left considerable coal on hand. This spells curtailed mining, although there are no indications as yet, that this will be necessary in the immediate future.

Bituminous—The heavy stocks many consumers had at their plants, are becoming depleted, but there still seems to be nothing that adds any backbone to the market, and the trade generally are not looking for any material change in the near future. The agreement with the miners of the central Pennsylvania district is not likely to open up many operations until there is a better market. The suspension of over a month by many operators does not seem to have made any gap in the apparent supply, and the predicted impetus to the trade has not materialized. The changes in prices over last week have been fractional. Good grades of Pennsylvania coals can be purchased at $1.35@1.55, and the cheaper grades at 35@50c. less.

BALTIMORE

Highly unsatisfactory conditions in the bituminous trade. Anthracite only fairly active, but in much better shape than soft coal.

That the present state of affairs in the bituminous coals leave much to be desired is an undisputed fact. The trade is regarded as the worst spring business for several years back. Not only has demand fallen off, but prices have continued to slump in all save the specialized coals that are practically all taken on contracts.

Considerable coal on consignment at tidewater points has resulted in a sharp breaking of prices in many instances. The worst slump seems to have occurred on the West Virginia gas coals. Slack has been a particularly weak grade, and sold in some cases down to 45c. Offerings are free in every direction and many would not be surprised to see a still further break. Run-of-mine at 75c. and three-quarter at 85c. were easily obtainable. Pennsylvania grades have been offered during the week as low as 90c. Best grades have been generally covered by contract, and any surpluses are held firmly around $1.35.

One encouraging feature just now lies in the export trade. All of the piers were busy the past week loading for European, South American and West Indian ports.

While the anthracite trade is much better than soft coal, there is still no great snap to it either. Steam sizes are in only fair demand, and a good many household consumers have been delaying their spring orders. Deliveries can be made up to the end of the present month on the lowest rate of the season.

A few contracts are being signed up gradually for the coming season, the prices being based on the same scale of wages as paid the past two years in the Illinois field. At the present the retail prices on bituminous coals are: Standard, $2.50; Mt. Olive, $2.75; Carterville, $3.12½. These prices will likely prevail until the first of August.

CENTRAL STATES

PITTSBURGH

Production down to 40% with demand light in all directions. Quotations heavily cut on prompt business, but firm on contracts.

Bituminous—There has been no improvement in the situation. Domestic demand is almost absent, while manufacturing consumption is far below normal, and has been decreasing further in the past week or two; railroad consumption is also light. The stocks accumulated some time ago are not all liquidated yet. Production in the Pittsburgh district is at not over 40% of capacity, or unchanged from last week. The suspension of mining in Ohio does not seem to have thrown any trade at all to this district. While some coal is being shipped in the lake trade the amount is altogether inconsequential.

Producers are holding firmly to regular prices when it comes to making contracts, for with production as light as it is now they have a full realization of the fact that cost of production may be particularly high, and they are possibly less prone to cut prices on contracts than they would be if approximately full operations were assured for the twelvemonth. For spot lots there are deeply cut prices in occasional instances, but the total volume of business is too small to make the prices of importance. Regular quotations are: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.80, per ton at mine, Pittsburgh district.

Connellsville Coke—The market is almost absolutely stagnant. No furnaces contemplate going into blast, while some of those in blast are going out. April saw a net decrease of 18 in the number of furnaces in blast in the country as a whole, and this month there has been a further decrease. The few consumers who were uncovered for May have not contracted, but are buying prompt coke occasionally. One consumer who had a contract for 20,000 tons for April, at $2, has arranged to have shipments continued at the figure indefinitely, but does not contract definitely to take a full month's tonnage. The market is quotable generally as follows: Prompt furnace, $1.85@1.90; contract furnace (nominal), $2; prompt and contract foundry, $2.35@2.50, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended May 2 at 305,610 tons, a decrease of 8147 tons, and shipments at 299,439 tons, a decrease of 10,770 tons. The best average ever maintained for a period of three months was about 425,000 tons a week, so that the movement is now 70% of the record

BUFFALO

Still no improvement in the trade. Some mines resuming work. Stocks begin to run low. Lake shipments much smaller than last season and will likely continue so. Coke quiet.

Bituminous—There are three new features of the trade now, none of which, however, have had any improved effect. The stocks in consumers' hands are running down and soon not only a good many private concerns, but the railroads also, will be back into the market, although they will buy spar-

ingly and will not want to pay fair prices at first. Eventually it will simply be a matter of the volume of business. If that starts up fairly well there will be a sale for coal, but if not it will be a dragging market right along.

A second feature is that there will be more or less of a general resumption of mining this week, and there will soon be more coal on the market. But it is given out by the leading operators that they are not going to mine coal unless they can sell it on orders. The third feature is that there is now enough three-quarter being made to increase the supply of slack. The lake trade, which demands so much three-quarter, is not active, but it is moving a certain amount of coal and as a consequence slack is piling up here and the prices are off.

In fact, the bituminous trade is not very hopeful, since if the mines return to anything like a full output there is going to be a surplus produced again. The quotations on bituminous are much the same as formerly as to price, there still being sales at the regular circular, $2.80 for Pittsburg lump, $2.70 for three-quarter, $2.55 for mine-run, and $2.15 (a reduction of 10c.) for slack. Allegheny slack is about on a par with Pittsburg, but sizes are 15 to 25c. lower.

Coke—There is no improvement in coke. Pig iron sells slowly and is moving still closer in the Canadian market than here. No particular improvement is looked for right away.

Anthracite—The hard-coal movement is light for this time of year, as there is so much in the Northwest unsold. Lake shipments are bound to be quiet for some time. If there is a disposition to sell early in the season the docks will free themselves, but otherwise the business will drag. Just now the small upper-lake ports are buying in order to take advantage of the lower prices. The large ports are bound to carry heavy stocks right along. Shipments by lake for the week were only 50,000 tons.

TORONTO

Domestic grades of anthracite steady with steam sizes dragging.

The market for domestic grades of anthracite is steady and a little more active since the usual spring reduction of prices. Steam coal is quiet owing to dullness in the manufacturing industries with a downward tendency in prices. Quotations are as follows: Retail anthracite, egg, stove and nut, $7.50; grate, $7.25; pea, $6.25. Bituminous, steam, $5.25; screenings, $4.35; domestic lump, $6; cannel, $7.50. Wholesale, f.o.b. cars, ¾ lump $3.60, screenings, $2.75.

TOLEDO

Demand light in all departments, but an improvement expected in the steam grades shortly. Some inquiries and an occasional order noted. Lake movement under way.

The coal trade in Toledo continues quiet, but most of the local dealers are optimistic over the future. The call for both domestic and steam coal is below normal, but it is believed that the demand for the steam grades will increase later on. Most of the factories laid in heavy stocks prior to the strike and many still have good supplies left. The railroads are beginning to run low, however, and inquiries from this source are becoming numerous with an occasional sale.

Large freighters are loading right along at the Toledo docks and a large amount of coal is carried here in the yards, especially those of the T. & O. C. Quick trips have been made by some of the lake freighters. The "E. L. Wallace" has made two round trips and the "Harry Yates," which cleared a short time ago for the Canadian Soo arrived back last Wednesday to take on another cargo. Of the seven big freighters which wintered at Bay View Park, four have loaded and gone on their first trip.

COLUMBUS

National officers of the miners refuse to call a strike in Ohio. Hocking Valley operators to meet with the miners shortly, and the situation is clarifying rapidly. Stocks are still large and demand continues light.

The principal events during the past week were the failure of the national officers of the United Mine Workers to ratify the strike, as voted for by the Ohio miners, and the move for a conference of operators and miners in the Hocking Valley. In other words, the situation is more clear and the stress is gradually passing away.

E. A. Cole, president of the Sunday Creek Co., and also president of the Hocking Valley Operators' Association, sent a letter to John Moore, of the state organization, asking for another conference. So far arrangements for the conference have not been made, but it is expected they will be in the near future. This is the first step in this state to settle the wage question by subdistricts, and the move is being watched with interest. The miners have no authority to agree to a lower scale, but it is probable that a referendum vote may be ordered in case the delegates so recommend.

Apparently stocks among steam users are sufficient for a month or more, and the domestic trade is also quiet. Some West Virginia coal is being shipped in, but it is selling at a rather low figure. The small sizes are somewhat stronger and prices are higher. There is some demand for the better grades of domestic coal and dealers are having a fair business for this time of the year. Dealers stocks are sufficient for some time to come.

Some West Virginia coal is being shipped to the lakes, although the prospects for an active lake trade are not bright. There is still considerable coal on the docks of the upper lake ports, according to reports.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@$1.35		$1.50@$1.40	$1.40@$1.35
¾-inch	1.30@ 1.25	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.25@ 1.20		1.30@ 1.25	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.10
Nut, pea and slack	0.90@ 0.85		0.85@ 0.80	0.75@ 0.70
Coarse slack	0.80@ 0.75	0.90@ 0.85	0.75@ 0.70	0.65@ 0.60

CLEVELAND

Lake traffic tending to maintain the coal markets in northern Ohio. Youghiogheny gas grades selling on a par with Fairmount gas. Lake vessels scarce because of the dullness in the lake freight market.

The pressure to move coal has held the market down all week and no improvement is anticipated for at least another three or four weeks. Youghiogheny slack was sold on the spot market as low as $1.70 and Fairmount gas mine-run has been traded for Youghiogheny gas on the basis of 20c. difference in favor of the mine-run.

There is no demand. The market is so slow that practically no consignment coal has been coming in. Pocahontas operators are holding firmly to the May circular, but are not accepting any new business for prepared sizes. Pocahontas slack has been sold as low as 85c., the mines, and it is reported even lower. The circular price is $1.25.

In the Lake Trade shipments from West Virginia are much larger than the demand or dock space justify. There is no market strong enough to warrant shipping consignment coal and lake ports are full. Shippers are having trouble getting boats because the iron ore and grain traffic is so light the vessels are without and eastbound freight. Lake Michigan shippers have an advantage as boats can at least break even coming back light from there. To the slow docks on Lake Michigan, however, a premnum of 5c. a ton has been paid for boats to run light for coal.

Shipment prices for available coals are as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.05		$2.00@$2.05
Lump, 1¼-in.		$2.35	
Lump, ¾-in.		2.25	
Mine run	2.60	2.10	1.85@ 1.90
Egg	3.05		
Nut		2.00	
Slack	2.20	1.70	1.70@ 1.90

CINCINNATI

The market continues sluggish, with practically no change since last week. Lack of activity in industrial lines has affected the steam market, which is now as bad as domestic grades, making the whole situation unprecedentedly dull.

With no signs of a revival and with the domestic market extremely quiet, save in the demand for Pocahontas smokeless, the present situation here is about as bad as it could be. A week ago the prospect of more or less serious labor trouble in the Kanawha district of West Virginia offered a reasonable prospect of a stronger market, but before it had a chance to manifest itself the men returned to work. Notwithstanding the short period of idleness, and the more prolonged shutdown in the Ohio field, the market refuses to respond.

The practical impossibility of securing boats for lake shipments has not changed for the better. It is undoubtedly true that the usual lake markets are to a large extent affected by the same dullness which is noted here and elsewhere, so that there is by no means a pressing demand for coal.

Occasional buyers are in the market for steam coal at fair prices, one or two sales of eastern Kentucky nut and slack being reported last week at 80c. There is nothing like a real movement at this or any other figures, however. Mine-run coal seems to be about the best fuel to send to this market at present.

DETROIT

Contract movement sharply curtailed. West Virginia coals taking the place of the Ohio product where required.

Bituminous—The local market is lifeless, operators still

having large stocks and not appearing to be the least worried over the restricted output. As a result of the curtailed shipments, slack prices are strengthening up slightly, but West Virginia steam lump and mine-run are offering considerable off the circular. Shipments on contract are heavily curtailed. Considerable of the West Virginia grades are coming in so that the effect of the complete shutdown in Ohio is not being felt. Much of the coal ordinarily going into the lake trade is being dumped into the Detroit market. Contract arrangements for Ohio coal are being delayed, pending the adjustment of the wage scale.

Anthracite—Hard coal is coming in in abundant supply, many of the dealers receiving their full requisitions, contrary to the ordinary rule. The outlook for May is also encouraging.

HAMPTON ROADS

Some improvement in Hampton Roads situation. Dumpings for week show up well. Government taking cargoes for vessels in Mexico and for station at Cavite.

Shipments of coal from Hampton Roads during the week past have shown some improvement. Two naval colliers and one sailing vessel have loaded for Key West and the vessels now in Mexico, and in addition there have been two cargoes shipped by the government to the coaling station at Cavite, P. I.; large coastwise and foreign cargoes have also moved, and, with the number of bunkers which have been taken care of, the dumpings should show up well. The accumulation of coal has been cut down to below normal at some of the piers.

During the early part of the week the Virginian Ry. piers were working to almost their full capacity. During ten hours on May 4 they dumped 303 cars into barges, sailing vessels and steamers, and the same night over 250 cars were dumped, making more than 550 cars, or about 27,500 tons in 24 hr.

The price of coal for export is practically the same as it has been for some months, and while circular figures on coastwise business are still being quoted, it is rumored that some cargoes for New England have been sold at somewhat below these.

Foreign shipments have moved to Dakar, Havana, Port Spain, Naples, Canal Zone, Montevideo and Kingston.

On May 1 retail dealers put in effect summer prices on the various grades of domestic coals. These prices are about 50c. a ton below the winter schedule except on Pocahontas and New River run-of-mine, which remain the same practically all the year round.

LOUISVILLE

Operations generally good, but market shows no improvement. Prices continue unchanged.

Though operations continue on an extensive scale, as compared with other bituminous mining districts, the market in general has showed no signs of improvement. The western Kentucky field is practically at a standstill. The local retail reduction of 25c. a ton, though it has resulted in a considerable volume of orders from domestic consumers, has had no appreciable effect on the general situation.

Steam sizes are plentiful both east and west and are in small demand. Though the reports of the railways seem to indicate that business generally is better than last year, it must be remembered that the railroad's operations a year ago were greatly curtailed by the floods.

Prices run about the same as a week ago, ranging from 50c. a ton for the pea and slack in the West, to from 60 to 75c. for Eastern nut. Of these grades the western Kentucky pea and slack, only, is stiff. The block coals of the Eastern field continue at from $1.30@1.85, the latter for the fancy grades.

SOUTHERN AND MIDDLE-WESTERN

CHICAGO

Slight increase in steam-coal trade. Anthracite quiet. Most contracts for smokeless coal now closed. The demand for Illinois grades is confined to screenings only. Coke market dull.

There is practically no demand for domestic coal and little fuel is being bought for storage because of unfavorable financial conditions. There is also little demand for anthracite coal, dealers showing no disposition to purchase for future. Buying for storage appears to be restricted to the all-rail trade only, and as a result operators are sending smaller shipments. There are two or three companies which have cut their prices to around a dollar. Lump and egg is selling at $1.60 as the market price, but this is only because little of these coals is being produced.

Illinois coals are not very active, screenings being the only kind for which there is any demand at all, and even these are lower by 10c. a ton. It is expected that the large railroads will begin to appear in the market soon. Inch and a half screenings are selling for 90@95c. per ton, while the better grade two-inch coal is selling for 95c.@$1. Conditions in the coke market are dull.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07	$2.30@2.40	$2.12	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.65
Mine-run	1.87	2.15@2.25	1.87	3.05@3.30
Screenings	1.77	1.95@2.05	1.67	

Coke—Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

INDIANAPOLIS

New wage agreement for the next two years signed up on practically the same basis as the expiring one. Operations increased in spots but still generally at only half capacity.

The most interesting development in the Indiana coal situation is the signing up of a new wage contract for two years. The miners gained a point in their demand for the delivery of the powder to working places and they conceded a point to the operators in assessing fines for the mining of dirty coal, while the wage scale continues the same. Trade conditions have shown little change. Some operators have put additional mines at work but as a general thing, only about half the mines are working.

ST. LOUIS

A further slump in domestic coals about equalizes an advance in the steam grades. Contracts being closed on the same basis as last year. Labor situation being cleared up.

During the past few days there has been a good demand for steam sizes, perhaps better than at any time since the mines suspended operations, but as the price advanced on these grades, the quotations on the domestic and larger sizes went down, so that it is an even break; that is, on a mine-run basis the coal is bringing about the cost of production, or perhaps slightly better. This pertains chiefly to the standard field. In the Carterville and Franklin County field there is little tonnage being produced, and that for the most part, on contract business.

In a retail way, locally, there is nothing doing in bituminous coals, but the tonnage of anthracite, being booked for early delivery, is exceptionally good. The smokeless market is slow, and indications at this time are that anthracite and coke will eventually crowd out, to a great extent, the smokeless tonnage.

KANSAS CITY

Market dull but indications are better for the summer and late fall. Light demand for domestic grades.

The situation in Kansas City has undergone little change except possibly a brisker booking of futures. The retailers are inclined to show more confidence in the fall and late summer trade because of exceptionally bright crop prospects in the Southwest. Immediate business is only fair, though steam lines have shown improvement enough to cause more optimism among operators. The lack of demand for lump has continued to give operators something to puzzle over, however, making the situation rather unsatisfactory in that respect.

FOREIGN MARKETS

GREAT BRITAIN

Apr. 29—There is a brisk demand for prompt coal of which there does not appear to be much available, and prices are rising. Some buyers now seem disposed to negotiate their requirements for ahead loading. Quotations are approximately as follows:

Best Welsh steam	$4.68	Best Monmouthshires	$4.20
Best seconds	4.56	Seconds	4.08
Seconds	4.20	Best Cardiff smalls	2.82
Best dry coals	4.32	Seconds	2.64

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry, $4.80@5.52; furnace, $4.08@4.56.

COAL FREIGHT DECISIONS

I. C. C. Nos. 5572; 5651; 5584—Campbells Creek Coal Co. vs. Ann Arbor R.R. Co. (No. 5572), H. C. Dickinson vs. Ann Arbor R.R. Co. (No. 5651), Compbells Creek R.R. Co., vs. Ann Arbor R.R. Co. (No. 5584).

1. Defendants' application of the main-line rates to points on the Kanawha & West Virginia and the Coal & Coke railroads while denying them to complainants constitutes undue and unreasonable prejudice and disadvantage to complainants, which should be corrected either by canceling the main-line rates to points on the lines mentioned or by establishing the main-line rates as joint rates with the Campbell's Creek Railroad.

2. No such undue prejudice may be predicated upon the application of the main-line rates to points on branches of the defendant Kanawha & Michigan Railroad.

3. The portion of section 1 which makes it the duty of every carrier subject to the act to furnish cars must be read into that portion of section 1 which deals with the matter of switching connections between common carriers and lateral branch lines. Huerfano Coal Co. v. C. & S. E. R.R. Co., 28 I. C. C., 502.

4. Defendants' contention that it would be impossible to hold the Campbell's Creek Railroad a common carrier without finding it guilty of a violation of the commodities clause, assuming defendants' construction of the law is correct, is not sustained by the facts.

PRODUCTION AND TRANSPORTATION STATISTICS

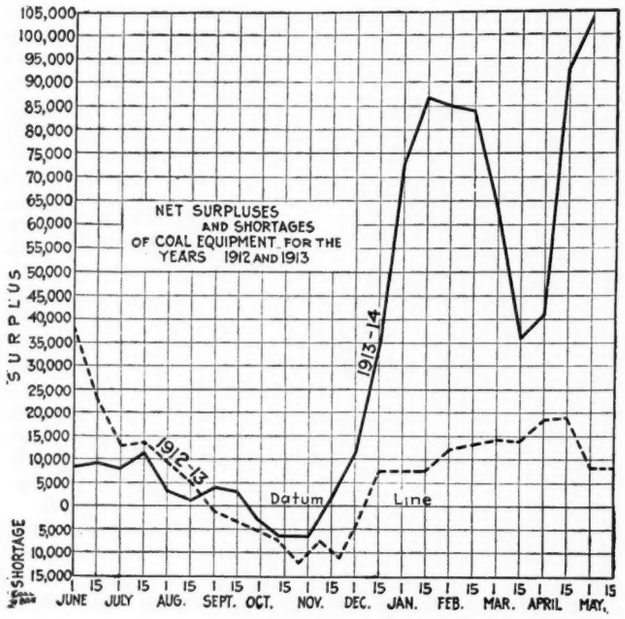
THE CAR SITUATION

American Ry. Association reports surplus and shortages of coal equipment for two weeks ended Apr. 15, as follows:

	Surplus	Shortage	Net*
New England Lines	1,620	0	**1,620**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	16,536	0	**16,536**
Ohio; Indiana; Michigan; Western Pennsylvania	42,205	0	**42,205**
West Virginia, Virginia, North & South Carolina	4,820	0	**4,820**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	14,039	0	**14,029**
Iowa, Illinois, Wis., Minn.; North & South Dakota	11,675	19	**11,656**
Montana, Wyoming, Nebraska	1,373	0	**1,373**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	3,653	10	**3,643**
Texas, Louisiana, New Mexico	572	0	**582**
Oregon, Idaho, California, Arizona	3,906	0	**3,900**
Canadian Lines	0	0	**6**
Total	100,399	29	**100 370**

	Jan. 1	Jan. 15	Feb. 1	Feb. 15	Mar. 1	Mar. 15	Apr. 1	Apr. 1
Surplus	72,535	87,149	85,489	84,775	64,822	39,133	41,055	41,055
Shortage	57	789	102	239	1,394	**3,282**	615	615
Net*	**72,478**	**86,360**	**85,387**	**84,536**	**63,428**	**35,851**	**40,440**	**40,440**

***Bold face** type indicates a surplus.



ANTHRACITE SHIPMENTS

Anthracite shipments for April and the first four months of the current year as compared with last year were as follows:

	April		4 Months	
	1914	1913	1914	1913
Phila. & Reading	1,185,930	1,180,115	3,884,153	4,579,408
Lehigh Valley	1,160,742	1,149,896	3,579,875	4,216,678
Cent. R.R. N.J.	748,162	738,579	2,766,684	2,978,872
Del. Lack. & West.	894,513	861,078	2,755,042	3,078,995
Del. & Hudson	615,573	561,700	2,090,979	2,344,688
Pennsylvania	619,159	585,472	2,166,567	2,082,297
Erie	648,426	672,386	2,548,960	2,745,928
Ont. & Western	199,649	216,963	741,790	859,199
Total	6,072,164	5,966,189	20,534,050	22,886,065

COAL MOVEMENT

The following is a statement of the fuel movement of various kinds for the past four months, in short tons, except where otherwise noted:

	January	February	March	April
Anth. shipments[4]	5,175,732	4,121,451	5,164,703	6,072,164
Penn. R.R.[3]	5,885,953	6,081,171	6,853,996	
B. & O. R.R.[2]	3,192,789	2,650,623	3,530,136	
C. & O. Ry.[1]	1,596,704	1,095,082		
N. & W. Ry.	1,679,836	1,666,475	2,112,118	
Va. Ry.	407,109	259,756	336,952	

[1]Bituminous coal only. [2]Coal and coke. [3]Bituminous, anthracite and coke. [4]In long tons.

NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during February and March of the current year in short tons:

	February	March
Pocahontas Field	942,477	1,161,793
Tug River District	204,074	246,490
Thacker District	198,228	274,786
Kenova District	71,401	88,616
Clinch Valley District	152,769	153,704
Other N. & W., Territory	3,694	2,741
Total N. & W. Fields	1,572,643	1,928,130
Williamson & Pond Creek R.R.	26,314	43,865
All other railroads	67,518	140,123
Grand total	1,666,475	2,112,118

The following is the destination of shipments for March and the first three months in short tons:

	February		Two Months	
Coal	1913	1914	1913	1914
Tidewater, foreign	120,288	158,247	387,294	428,672
Tidewater, coastwise	327.631	342,530	973,751	991,863
Domestic	1.303,239	1,611,341	4,333,531	4,323,872
Coke				
Tidewater, foreign	70		10,034	15
Domestic	147,660	103,070	438,794	317,699
Total	1,898,888	2,215,188	6,143,404	6,062,091

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending May 9:

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	84½	84½	84½	86½	82
American Coal Products Pref.	102	102	102	106	102
Colorado Fuel & Iron	27½	26¾	27	34½	24
Colorado Fuel & Iron Pref.	....	....	140	140	140
Consolidation Coal of Maryland	....	....	102½	....	....
Island Creek Coal Com.	50½	47½	49½	....	....
Island Creek Coal Pref.	86	85	86	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	20⅝	20¼	20¼	23½	17⅛
Pittsburgh Coal Pref.	89½	87⅞	88⅞	93½	84
Pond Creek	18⅜	17	17½	....	....
Reading	165¼	163	164¾	172¼	158½
Reading 1st Pref.	88¼	88¼	88¼	89	87½
Reading 2nd Pref.	89	88¾	89	93	87½
Virginia Iron, Coal & Coke	..	..	45	52	40

Bonds	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	90¼	..	99¾	91¾	91½	99
Colo. F. & I. gen. 6s	105	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	74	Sale	73	74	73	82
Cons. Ind. Coal Me. 1st 5s	..	74	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89½	90½	90½	90½	89	90½
Gr. Riv. Coal & C. 1st g 6s	89	..	99½	Feb. '14	99½	99½
K. & H. C. & C. 1st s f g 5s	..	..	102½	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	89½	..	93	Mar. '14	93	93½
St. L. Rky. Mt. & Pac. 1st 5s	86½	87½	88	Apr. '14	84	88½
Tenn. Coal gen. 5s	78	80	77	Apr. '14	77	82
Birm. Div. 1st consol. 6s	103½	Sale	103½	102	97½	103½
Tenn. Div. 1st g 6s	101½	103	102	Apr. '14	101½	103
Cah. C. M. Co. 1st g 6s	101¼	103	102	Mar. '14	101	102½
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼	101¼
Victor Fuel 1st s f 5s	..	84	73	Apr. '14	73	73
Va. I. Coal & Coke 1st g 5s	90	Sale	90	90	90	95

No Important Dividends were announced during the week.

Index of Coal Literature

We will furnish a copy of any article (if in print) for the price quoted. Where no price is quoted, the cost will be nominal. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order.

ACCIDENTS AND THEIR PREVENTION

100—Monthly Statement of Coal-Mine Fatalities in the United States, February, 1914. Albert H. Fay. Bureau of Mines; 8 pp.

101—Monthly Statement of Coal-Mine Fatalities in the United States, January, 1914. Albert H. Fay. Bureau of Mines; 6 pp.

BLASTING, EXPLOSIVES

102—Blasting Gelatine: Some Notes and Theories. (Abstract of Paper by W. A. Hargreaves read before the Soc. of Chem. Indus.) Iron Coal Tr. Rev., Apr. 24, 1914; 1⅓ pp. 40c.

103—Flame Phenomena Observed on Firing Permitted Explosives in the Mortar. E. Lemaire. (Translated from Ann. d. M. de Belgique.) Coll. Guard., Apr. 17, 1914; 1⅞ pp. 40c.

104—Priming the Shot. Coll. Engr., May, 1914; ¾ p., illus. 35c.

105—The Use of Fuse and Detonators in Wet Blasting Operations. Clarence Hall. Eng. Mag., May, 1914; 4¾ pp., illus. 35c.

BRIQUETTES

106—Fuel Briquetting in 1913. Edward W. Parker. U. S. Geol. Sur., 1914; 5¼ pp.

COAL DUST

107—A New Method of Treating Coal Dust. Iron Coal Tr. Rev., Apr. 10, 1914; ⅞ p., illus. 40c.

108—Coal Dust Experiments at Tirpentwys Colliery. Coll. Guard., Apr. 3, 1914; 1¼ pp., illus. 40c.

COKE

109—Notes on the Utilization of Coke-Oven and Blast-Furnace Gas for Power Purposes. Heinrich J. Freyn. Bull. A. I. M. E., April, 1914; 28¼ pp. 40c.

110—Reflection on Temperatures of Distillation, and Their Influence on Byproducts—III. G. P. Lewis. Gas Wld., Apr. 11, 1914; 2 pp., illus. 40c.

111—The Automatic Control of Byproduct Coke-Oven Plants—V. (This installment deals with pyrometers.) A. Thau. Gas Wld., Apr. 4, 1914; 2¾ pp., illus. 40c.

112—The Automatic Control of Byproduct Coke-Oven Plants—VI. (This article of the series deals with meters.) A. Thau. Gas Wld., May 2, 1914; 3½ pp., illus. 40c.

COMPRESSED AIR

113—Compressed-Air Transportation in British Coal Mines. Alex Sahlin. Iron Coal Tr. Rev., Apr. 17, 1914; 1½ pp., illus. 40c.

114—Multi-Stage Air Compressors for Diesel Engines Coll. Guard., Apr. 17, 1914; 1 p., illus. 40c.

DRAINAGE, PUMPING, ETC.

115—A Self-Cleaning Screen for Pump Intake. J. E. Johnson, Jr. Eng. & Min. Jour., Apr. 18, 1914; 2 pp., illus. 25c.

116—Pump Motors for Mining Work. Iron Coal Tr. Rev., May 1, 1914; ½ p., illus. 40c.

117—Rotary Pump and Hydraulic Variable-Speed Transmission. Amer. Mach., May 7, 1914; 3 pp., illus. 25c.

118—Safety Application of the Swing-Gate Valve. O. C Schmidt. Coll. Engr., May, 1914; 2 pp., illus. 35c.

119—Water Pumping at Anthracite Mines. Coal & Coke Op., Apr. 23, 1914; 1⅓ pp. 20c.

ELECTRICITY

120—Automatic Controllers for Mining Work. (Paper read by G. W. Humphrey before the Assn. of Min. Elec. Engrs.; So. Wales Branch.) Iron Coal Tr. Rev., Apr. 24, 1914; 2 pp., illus. 40c.

121—Electric Ignition of Methane-Air Mixtures. Iron Coal Tr. Rev., May 1, 1914; 1¼ pp., illus. 40c.

122—Tests on a Kapp Vibrator. (The use of this machine improves the operating qualities of a motor not only by correcting the power factor, but also by considerably increasing its overload capacity and maximum torque.) Coll. Guard., Apr. 9, 1914; ½ p., illus. 40c.

123—Transmission of Electricity Underground. (Paper by Alex. Anderson read before a joint meeting of the Yorkshire Branches of the Assn. of Min. Elec. Engrs. and Natl. Assn. of Coll. Mgrs.) Iron Coal Tr. Rev., Apr. 3, 1914; 1⅓ pp. 40c.

124—The Safety of Underground Installations. C. M. Means. Bull. A. I. M. E., April, 1914; 3¼ pp. 20c.

EXPLOSIONS

125—Automatic Distribution of Stone Dust by the Air Current. (Discussion of paper by H. W. G. Halbaum on above subject at meeting of No. of England Inst. of Min. & Mech. Engrs.) Iron Coal Tr. Rev., Apr. 10, 1914; 1 p. 40c.

126—Ravenswood Explosion. Samuel Dean. Coll. Engr., May, 1914; 2 pp., illus. 35c.

127—Reports on the Senghenydd Explosion. Coll. Guard., May 1, 1914; 6½ pp., illus. 40c.

128—The Analysis of Combustible Gases by Explosion. E. Hauser. (Trans. from Achives des Sciences.) Coll. Guard., Apr. 3, 1914; ⅞ p. 40c.

FUEL TESTING

129—Resins in Paleozoic Plants and in Coals of High Rank. David White. U. S. Geol. Sur., Prof. Paper 85-E; 18½ pp., illus.

130—Tar-Forming Temperatures of American Coals. O. C. Berry. Univ. of Wis., Bull. 635; 67 pp., illus. 35c.

GENERAL

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